



FRIDAY, JULY 23, 1897.

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Contributions.

The Status of the Electric Railroad.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your editorial, issue of July 9, regarding electric railroading and think it is an admirable summing up of the situation. It is quite important in the present status of the the problem to prevent any unreasonable expectations being raised in the minds of railroad men which will only react in the future to deter legitimate development in the new field. I see no indications that we have made very material progress yet toward adapting, in a commercial sense, electric traction for general steam railroad operation, but it is certain that there is a special field for it and railroad officers should keep its advantages and limitations clearly in mind.

E. E.

The Port Chalmette Haulage Plant.

CHICAGO, July 14, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with much interest two editorials in your issue of July 9. The one on the "Status of Electric Railroading" is by far the most sensible and reasonable article I have seen on this subject. There is so much bluster and blow about all matters pertaining to electrical subjects that it is seldom anything appears that has the truth to recommend it.

Regarding the compressed air editorial, the points you bring up are all good. I can but think there were other considerations beside economy which prompted this change to electricity and do not look for compressed air to come into general use until backed up by one or more strong corporations that will offer the same inducements as the electric companies.

In the matter of the New Orleans plant, I do not think it would be hard to find a number of mechanical engineers who would be willing to re-design the compressed air plant for a small percentage of the saving over two cents a bale.

According to the statement of your correspondent, one-half the time of the air locomotives was consumed in recharging—doing no useful work. The difference in the cost of handling freight was $\frac{1}{2}$ cent per bale, or 25 per cent. more for the compressed air. At proportionately small cost the storage capacity could be increased so that the air-engines would be in service enough of the time to make up the whole (or more) of this 25 per cent. If the insurance rates on stored cotton are anything like those for grain elevators, quite the largest saving would be in the reduction in insurance by using compressed air. It has been found to be economical to build fireproof grain elevators for this reason alone, although the fireproof construction is very expensive. A few large fires at Port Chalmette would be of benefit to people who might follow the example set at this point.

LOOKER-ON.

NEW YORK, July 12, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the coming battle between compressed air and the trolley, there will doubtless be recorded during the earlier stages of the war occasional victories of the older over the younger system. To any one familiar with the powerful and far-reaching schemes of the electric corporations and with the underlying facts and propositions upon which the two systems are founded, the announcement of such victories are liable to be regarded with more or less suspicion.

It has been written that the "trolley must go." It is

a crude, awkward, disfiguring and unmechanical method of propulsion.

In the very fair letter of your New Orleans correspondent in your issue of July 9 he refers to the alleged greater economy of the electric over the compressed-air motors as being attributed in great part to the saving in track maintenance. Of course, a lighter electric motor would have less track maintenance than a heavier air locomotive, but then it would haul less. The Hoadley-Knight compressed-air motor, which is built on the plan of the electric motor (an iron-clad geared motor, one end resting directly on the axle) weighs 1,500 lbs., as against 2,800 lbs. for an equivalent electric motor (a motor that will slip the wheels on a dry rail under a weight of 30,000 lbs.).

The total weight of a Hoadley-Knight compressed air street car is the same as that of a G. E. 1,000 trolley car, but its rigid weight on axle, to which track maintenance is supposed to be mostly chargeable, is only about one-half.

Of course there can be no fair comparison between the economy of an electric system and a compressed-air system, when the latter was not equipped with ample storage capacity, so that the compressor could be run continuously during working hours on a practically constant load. With such storage, compressed air has no difficulty in meeting its rival in the matter of economy in power. Why the electric system can get along with less skilled labor than the air system does not appear. A compressor is practically the same as a steam engine reversed, and the motor is the same as the steam engine, so that one class of mechanics is competent to care for the whole equipment, whereas, with the electrics, you must have a distinctly different class.

It is gratifying to note from your editorial a disposition to look into the subject with unprejudiced eyes, and the writer, who is only desirous that the best may win, feels sure that the sequel will justify a little waiting.

It must have been strong influence, indeed, that induced the Port Chalmette to make this distinctly retrograde move.

W. H. KNIGHT.

The Boston Elevated Railroads.

BOSTON, July 19, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In common with many others, I am much interested in the communication which appears over the signature of "Rapid Transit" in your current issue. The public of Boston and its suburban communities are naturally alive to the importance of having the very best type of structure for the elevated roads, which are at last in view, and on that account will welcome discussion by competent critics.

Your correspondent writes: "It is somewhat discouraging to learn that the old types of structure are to be so closely followed." I do not understand just what portion of the proposed structure it is which elicits this expression of regret, whether the lattice girder or the construction as a whole. If the former, it occurs to me that the lattice girder is in general use on the Manhattan system, while the Chicago roads (except the loop now under construction) as well as the New York Suburban, have girders of plate construction.

Then it is suggested that the proposed third track is open to serious objections, such as the exclusion of the inter-track station arrangement and the alternative of a four-track structure is urged as the remedy. I am not sure that I correctly follow "Rapid Transit's" reasoning on this point, for while he writes of the ease with which a maximum speed of 35 miles an hour can be attained on elevated railroads, he anticipates an average speed of but little over half that, even with the suggested addition of two inner tracks on the Manhattan Railway. From all that I hear it is at least open to doubt whether a maximum speed of 35 miles per hour is attainable in actual elevated railroad practice, for very few such roads are now running over 20, the average rate being nearer 12 miles.

It is important, in this connection, to keep local conditions in view, and in Boston, as is well known, the cry has always been against the narrowness of the city streets whenever elevated roads have been discussed. In view of this consideration it seems no more than natural that a two-track structure, with provision for an ultimate third track, should have been accepted as a reasonable solution of an admittedly difficult problem.

There is another matter which should not be overlooked, in the fact that the proposed elevated roads are not to displace the existing West End tracks, but are to be built over them at all points, and operated with them as one concern. This will tend largely in the direction of an express type of service, even with the initial two-track elevated structure. It will certainly facilitate the adoption of longer distances between elevated stations than would otherwise be practicable. In this way, the surface lines, carrying on accommodation service, may be expected to act as feeders to the elevated system.

The necessity for placing the elevated road posts wide enough apart to clear the two surface tracks has probably been a factor in the adoption of the three-track idea, instead of a final limit of two, but there will be solid advantages from this in the possible extra provision for the "rush hours," during which there is a large preponderance of travel in one direction. As a long-suffering suburban resident, I look with confidence toward a result of this character from the plans now fairly on their way toward realization.

VIATOR.

The Heaviest Equipment Orders.

Generally speaking, the car and locomotive orders placed this year, while considerable in the aggregate, are in small lots. The heaviest orders placed by any single railroads, so far as we have ascertained, are by the Mexican Central, the Canadian Pacific and the Baltimore & Ohio. The Mexican Central is enjoying a time of considerable prosperity: its gross earnings for the first six months of this year showed a much greater increase than other road, viz., \$1,729,000. But for the fact that its revenue is collected in depreciated silver this road would be highly prosperous. The Canadian Pacific is also enjoying substantial gains in earnings, viz., \$559,000 for the half year. The special reasons for heavy equipment orders on the Baltimore & Ohio are familiar to all. The summary which follows shows the orders placed by these roads since Jan. 1, 1897.

The Mexican Central has recently added 20 engines to the contract with the Brooks Locomotive Works, making 46 engines, to be delivered prior to Oct. 1. Of these, 25 are 10-wheel freight engines and 11 are consolidation engines.

The car contract with the Michigan Peninsular Car Co. has been extended to cover 475 additional freight cars, making a total of 1,135 cars, which will be delivered prior to Aug. 15.

Of the 10-wheel engines above mentioned, 25 have cylinders 20 in. x 24 in., 107,000 lbs. on the drivers, total weight 137,000 lbs., with 60-in. drivers; 10 have 19 in. x 24 in. cylinders, 62-in. drivers, 107,000 lbs. on the drivers, total weight, 137,000; the consolidation engines have 21 in. x 26 in. cylinders, 56-in. driving wheels, 160,000 lbs. on the drivers, total weight 180,000 lbs.

On the Canadian Pacific since January 1st the following engines have been built, or are building, in the company's shops at Montreal:

Ten switching engines.	
Two consolidation engines.	
Three 10-wheel compound freight engines.	
Six " passenger engines 19 x 24.	
Six " " 18 x 24.	

The following cars are under construction: 600, 35-ft. 30-ton box cars building in the company's shops at Perth, Ont. They will be equipped with Hein or Trojan couplers, Westinghouse air brakes, standard brake beams, trucks and wheels all made in the company's shops, and steel axles made by the Nova Scotia & Steel Forge Company; 130, 20-ton flat cars have just been re-built in the company's shops at Perth and Farnham; 200 20-ton flat cars are building by Rhodes, Curry & Company of Amherst, N. S., and will be equipped with Hein couplers; 200 20-ton flat cars are being built by the Crossen Car Manufacturing Co., of Cobourg, Ont., and will be equipped with the Hein coupler. In addition to the above, the company is just completing 100, 35-ft. refrigerators equipped with all modern refrigerator appliances, and, of course, with vertical plane couplers and air brakes. Several new passenger cars have also been added this year.

On the B. & O. the Receivers have ordered the following new equipment in 1897.

Three thousand box cars from the Pullman Car Company.
Five hundred coal cars from the Michigan-Peninsular Car Company.
Twenty freight and five passenger locomotives from the Baldwin Locomotive Works.
Fifteen freight locomotives from the Pittsburg Locomotive Works.

Within the past year and a half about 10,000 new freight cars and 140 locomotives have been ordered and added to the equipment of this road.

Movement of Christian Endeavor Excursions.

Rio Grande Western.

The Christian Endeavor movement over the Rio Grande Western aggregated about 17,000 passengers. An officer of the road says:

"From 12:01 a.m., July 2, up to the end of the special movement the Rio Grande Western Railroad had 67 passenger trains out of Grand Junction with 13,391 passengers, conductor's count. Besides this we have had trains aggregating an even hundred cars, of which conductors have made no report, but which it is estimated carried 3,550 passengers, making a total of 16,941. On July 1 we probably carried 500 passengers, making a total of 17,041. This is believed to be a conservative estimate."

In view of the successful handling of such a large traffic, Vice-President D. C. Dodge has sent to General Superintendent Welby a congratulatory letter, in which he says:

"I desire that you express to each and every employee of the operating department our sincere appreciation for their loyalty, faithfulness and excellent judgment in handling from our eastern terminal, Grand Junction, Col., to Ogden, Utah, the large number of Christian Endeavor special trains, carrying upward of 17,000 persons, this without delay or slightest accident to person or train."

"I am not unmindful of the many difficulties there were to overcome nor the large amount of detail to arrange, to so successfully carry out so great an undertaking; nor of the experience on and the recent record of much larger railroads, with their greater resources, in meeting an emergency such as we have just passed through. It has been suggested that we have made 'the world's single track passenger record.' We believe this to be true and feel justly proud of the achievement. We recognize that our record was made by each and every employee zealously, intelligently and cheerfully performing his duty. It was the combined effort and single pur-

pose of all to this end that accomplished this most enviable result."

The Rio Grande Western hauled a number of trains of 16 cars each, and in one case a single train, propelled by three engines, contained 20 cars and measured 1,240 ft. in length. The ruling grades on this road, west bound, are one of 13 miles long, 132 ft. per mile; one seven miles long, 200 ft. per mile, and one 18 miles long, 106 ft. per mile.

The Rio Grande Western handled all the through freight that was offered and the only assistance it received was the loan of one engine from the Oregon Short Line to haul a train of live stock (from the Southern Pacific) from Ogden to stock yards, a distance of about 30 miles. The Rio Grande Western's connections sent out notices before the excursion movement began that freight traffic would be suspended.

Southern Pacific.

An account of the movement of the Christian Endeavor excursions over the Southern Pacific was given in the *Railroad Gazette* of July 16, page 501. Since then we have received a letter from an officer of the road, giving a few additional particulars. The average time of the 59 special trains over that road, 833 miles, was about four hours longer than that of the regular passenger trains, and the principal cause of this delay was the long time taken at meal stations. Although the road provided lunch counters, greatly enlarging the facilities at all eating stations, a large percentage of the passengers in the excursion trains declined to avail themselves of the extra facilities, insisting on sitting down to their meals in regular fashion. At some stations, the normal feeding capacity of which was 120, train loads of 350 or 400 people would insist on having their full rights and, as a consequence, the train was delayed two hours or more.

As an instance of the work done by the dispatchers in handling trains on this occasion, our correspondent cites the movement of Southern Pacific train No. 3, eastbound, July 7. This train left Sacramento 1 hour and 15 minutes late. It did all its usual work, was delayed 13 minutes at Colfax to take a carload of fruit, and arrived at Truckee, 120 miles, 1 hour and 30 minutes late. It met Endeavor specials at Sacramento, Arcade, Rocklin, Pearyn, Bowman, Applegate, Colfax, Towles, Emigrant Gap, Tamarack, Summit and Tunnel 13, a total of 12 trains. In other words, taking into consideration the delay of 13 minutes at Colfax, this train was successfully interwound through the 12 westbound trains, meeting on an average one every 10 miles, and no two of them at the same station, and it not only held its own, but gained eight minutes on its schedule time; and this, be it remembered, was not a light train, with the opportunity of sprinting rapidly from one meeting point to the next, but was a heavy train of 12 cars, among which were three sleepers and one diner, which was ascending a grade ranging, for nearly the entire distance, from 95 ft. to 116 ft. to the mile. Two-thirds of the trip was made in the night.

The train was directed throughout this trip by Dispatcher F. A. Edinger. He was too modest to call attention to the record himself, but the movement of the train is highly creditable to him and we take pleasure in publishing it.

The Pullman Car Co., provided 600 extra sleeping-cars for the Christian Endeavor movement, of which 348 started from Chicago. The number of extra Wagner sleeping-cars sent out of Chicago was 153.

Another Fast Run.

The credit due the New York Central for the performances of its fast locomotives is based not on high speed alone—other roads have made fast time—but on the great regularity with which it runs a very fast train 440 miles every day, making up lost time when necessary and delivering the train at the end of the road on time without exception for weeks in succession. It is worthy of note, therefore, though not such a great event as some newspapers describe it, that on Friday, July 16, the Empire State Express ran from Syracuse to Buffalo, 148.8 miles, in 143 minutes, equal to 62.5 miles an hour. This included a stop at Rochester of two minutes, besides an estimated loss of four minutes at other places where speed had to be reduced, making the net running time about 137 minutes, equal to about 65 miles an hour. The train left Syracuse 23 minutes late, and reached Buffalo only two minutes late. From Batavia to East Buffalo, 32 miles, the time was 26 minutes, equal to nearly 74 miles an hour. The locomotive hauling the train was the well-known No. 903, designed by Mr. William Buchanan and built by the Schenectady Locomotive Works in 1892. The engraving on this page is from a photograph of engine 897, which is a duplicate of 903. The principal dimensions of No 903 are:

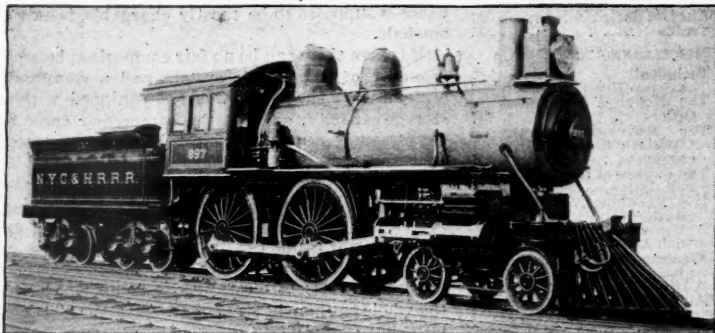
Cylinders.....	19 X 24 in.
Diameter of drivers.....	34 in.
Driving wheel base.....	8 ft. 6 in.
Total wheel base.....	23 " 11 "
Weight on drivers.....	81,400 lbs.
Weight on truck.....	44,750 "
Total weight.....	126,150 "
Boiler pressure.....	180 "

The run here recorded was an exceedingly fine performance, and engineman Edgerton deserves all the credit that he has received; but when the reporters say that this trip "breaks the record of every railroad in the world," they gush a trifle too much. The Central itself has run a train from Albany to Syracuse, 148 miles in 130 minutes (68.23 miles an hour) and the Lake Shore

train of Oct. 24, 1895, ran 181.5 miles at 68.67 miles an hour, including stops. The Empire State itself, has, we believe, done nearly as well as this before. The present run is more remarkable, perhaps, on account of the fact that no special preparations had been made; and the weight of the cars was 374,200 lbs., exclusive of passengers and baggage, which is 23 per cent. more than the weight of the cars in the Lake Shore special train, and more than twice as great as that of the Albany Syracuse special.

Improved Arrangement of Reducing and Intercepting Valves—Rogers Compound Locomotives.

In the *Railroad Gazette*, March 17, 1893, was published a description of the two-cylinder compound locomotive, No. 424, built by the Rogers Locomotive Com-



New York Central Locomotive No. 897.

pany for the Illinois Central. At that time drawings of the reducing and intercepting valves were shown, while in the *Railroad Gazette* of Nov. 22, 1885, several important changes in these parts were illustrated. We now show the latest form of reducing and intercepting valves as applied to five compound locomotives now in service in Jamaica, and four in use in Chili.

In the former arrangement the lever which locked the reducing valve was operated by the movement of the reverse lever. This in the present device has been dispensed with, and the small eccentric A, and the rod B, shown in the figure, are used instead. The eccentric and handle are located inside the cab within easy reach of the engineer, while the rod B is connected to the lever C, which operates the reducing valve. When the handle of the eccentric is in the position D there is no tension on the rod, and the reducing valve is free to operate; but when in the position E a tension is brought on the rod the valve F is held up against its seat, and the reducing valve is locked and rendered inoperative.

The reducing valve is the same as originally used, and consists of a chamber M to which the steam in the dry pipe has free access through the pipe N. The upper piston is 3 1/2 in. diameter, and the valve, F, is 3 1/2 in., thus making the area of the valve twice that of the piston; the stem connecting the two is 1 1/2 in. in diameter, is made hollow to save weight and extends out through the case at the top, having a slotted hole near its end into which a short arm, O, is fitted. This arm is part of the lever C, which is operated from the cab. The valve, F, when free, acts automatically, closing whenever the back pressure below it in the pipe L becomes half that above it in the chamber M, and opening as soon as the pressure in L is less than half that in M.

At starting, with the handle in the position D, the re-

mentarily from time to time, a, for instance, when the throttle was closed and opened again; at such times more or less live steam at reduced pressure would pass through the reducing valve to the low-pressure cylinder until the pressure in the receiver was sufficient to cause the valve F to close.

Instead of the small cylinder with a hollow piston and connecting rod, which was originally used for closing the intercepting valve, a single cast-steel pipe, G, with a square opening at its end, H, forms a continuation of the pipe L. The intercepting valve, I, is made of cast steel and consists of a flap valve swinging on journals, as shown. The boxes in which the journals turn permit of a slight sliding motion at right angles to the face of the valve, so that the valve always lies flat on its seat when closed. The lower side of the intercepting valve is fitted with a curved, rectangular section, hollow projection, or horn, J, which fits loosely in the square opening at H when the intercepting valve is open; this is its position when the engine is worked as a compound.

The receiver is practically empty at starting and the tension on the rod B is released by turning the handle in the cab up; by opening the throttle live steam at about half the pressure of that going to the high-pressure cylinder passes down the pipe L and pushes the horn J of the intercepting valve out of the end of the casting G, thus swinging the intercepting valve out toward its seat, K. The live steam is then free to enter the low-pressure steam chest. The intercepting valve remains closed until the pressure on its upper or receiver side balances that due to the live steam below when it falls open and assumes the position shown in the drawing. In closing, when the intercepting valve has gone half its full distance, the horn J passes out of the end of G, and when it is open ample space is provided for the free flow of the steam toward the low-pressure cylinder.

This arrangement has worked so satisfactorily and is so simple and inexpensive that the Rogers Locomotive Company has decided to adopt it in preference to any of the other numerous devices used for the same purpose on the two-cylinder compound locomotives.

The Failure of the Melting Dams.

As a result of the heavy rains last week two dams belonging to the Fishkill & Matteawan Water Co. gave way early Wednesday morning, July 14, destroying about \$30,000 worth of property and causing the death of seven people. The dams were in the Fishkill Mountains, about a mile east of Dutchess Junction, N. Y. They made two ponds, known as the Melting reservoirs, which were a part of the water supply of Fishkill and Matteawan. The reservoirs were of about 6,000,000 gals. capacity each, and collected the surface water from the sides of two neighboring mountains, which, together, made a watershed of probably more than 10,000 acres. The ponds were some 500 ft. up the mountains, and their overflow ran into the Hudson River by way of a small stream running through a ravine the greater part of its length. The dams were built across the upper part of this ravine and made practically one reservoir, in two parts, at different levels. The upper dam was about 1,000 ft. further up

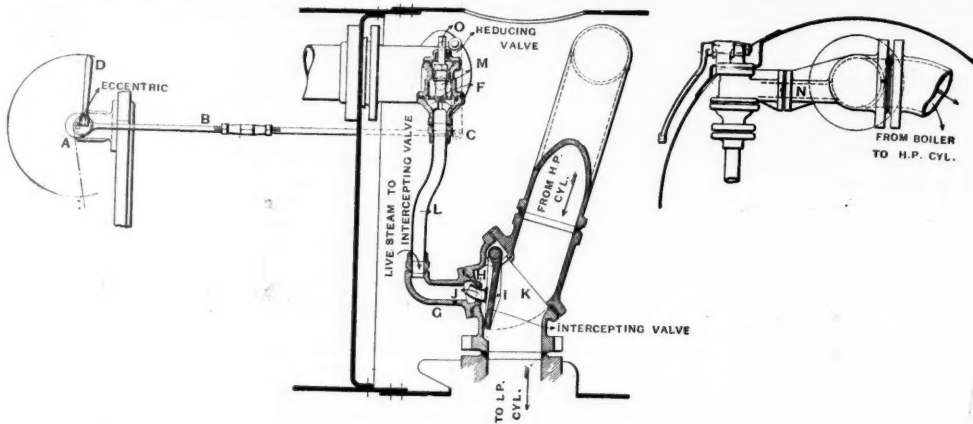


Fig. 1.—Rogers Intercepting and Reducing Valves.

ducing valve is free to act and with the throttle open steam passes through the reducing valve, down the pipe L, to the intercepting valve at half the pressure in the dry pipe at the time, whatever it may be. After the engine has started and the drivers have made two or three revolutions, the exhaust from the high pressure cylinder gives to the receiver its proper proportion of pressure, and the engineer turns down the handle in the cab to the position E, which, as stated before, locks the reducing valve; the handle is left in this position until another start is made, when the same operation is repeated. Locking the reducing valve prevents it from needlessly acting while running, as it would do mo-

the ravine than the lower, and together they formed two ponds covering about 2 1/2 acres and 30 or 35 ft. deep.

The dams were built eight or ten years ago, and were made with a masonry core with earth slopes on both sides. The upper dam was about 250 ft. long and 30 ft. high at its center. The core wall, which was 3 ft. thick at the bottom and 1 ft. thick at the top, and extended the full height of the dam, was made of cobble and irregular stones of various sizes laid in cement mortar. This wall was built in a narrow trench dug across the ravine, and apparently rested on the natural surface of the rock, which at that place came nearly to the bottom of the reservoir. On the up-stream side, of the core

there was a ripped slope of 2 to 1, made of compact sandy loam and gravel. On the down-stream side there was an unprotected earthen slope of 5 to 3. The top of the dam was about 12 ft. wide, and sloped slightly upward toward the down-stream side. The spillway, at the west end of the dam, was about 47 ft. wide, and the overflow went over a stone wall built across the spillway. This wall was 23 in. high, its crest coming but a little more than 2 ft. below the top of the dam, and seems to have been built after the dam was finished, in order to increase the capacity of the reservoir.

The lower dam was about 220 ft. long and built like the upper one, except that both slopes were about 2 to 1, and the lower one was sodded. The masonry core was about 24 ft. high at its center, and extended to the top of the dam. The spillway was about 60 ft. wide, and the overflow, as in the other dam, ran over a stone wall, the crest of which was about 28 in. below the top of the dam.

The upper dam gave way at its west end, a section 80 ft. wide at the top and about 20 ft. wide at the bottom, and reaching down to bed-rock, having been broken out. The earthwork and all but a few pieces of the masonry core were carried away by the water. The lower dam broke near the middle, a section about 50 ft. wide at the top and half as wide at the bottom, and extending to within 3 or 4 ft. of the bottom of the reservoir, having been carried away. The lower slope of this dam was washed in several places by the water which ran over its top so as to be materially weakened.

The indications are that the water, on account of an insufficient spillway, was forced to run over the crest of the upper dam. In doing this, it washed away the lower slope to such an extent that the remaining earth work and masonry core, no longer able to withstand the pressure, gave way, to be followed almost immediately by the bursting of the lower dam, due to a like cause. This is only another instance of the old story of an inadequate spillway.

The bursting of the dams caused a washout on the New York Central & Hudson River road at a point about a mile south of Dutchess Junction, a little north of where the road crosses Tonawanda Creek, the outlet by which the discharge of the reservoirs ran into the Hudson River. The two main tracks and a passing siding were washed out for a distance of 800 ft. and to a depth of from nothing to 8 ft. The two main tracks were carried out of line from 25 to 30 ft. The tracks were also covered with debris, consisting of parts of buildings, trees, stumps, dirt, etc., to a depth of 8 and 10 ft. The tracks remained well tied together, and were self-sustained across the washout. The washout occurred at 2.25 a. m., and at 5 o'clock the wrecking trains were at the spot. Mr. D. B. McCoy, Division Superintendent, arrived about the same time to take charge of the repairs. All of the track forces of the division were concentrated on the work. The northbound track was pulled back in line and cobbled and cribbed up with anything at hand, ties and timbers from the debris being largely used. A temporary track was thus made, over which trains could be run. The first train crossed on this track at 8:50 a. m., approximately four hours after repairs were begun. Between 9 and 10 a. m., 10 northbound trains and between 10 and 11, 10 southbound trains were handled over this temporary single line. A hundred cars of gravel, which were near at hand, were run to the scene and used in the work. By 2 o'clock in the afternoon, both main tracks were in service at a speed of 15 miles an hour and by night at a speed of 25 miles an hour. By the next day noon, trains were run over the road at regular speed.

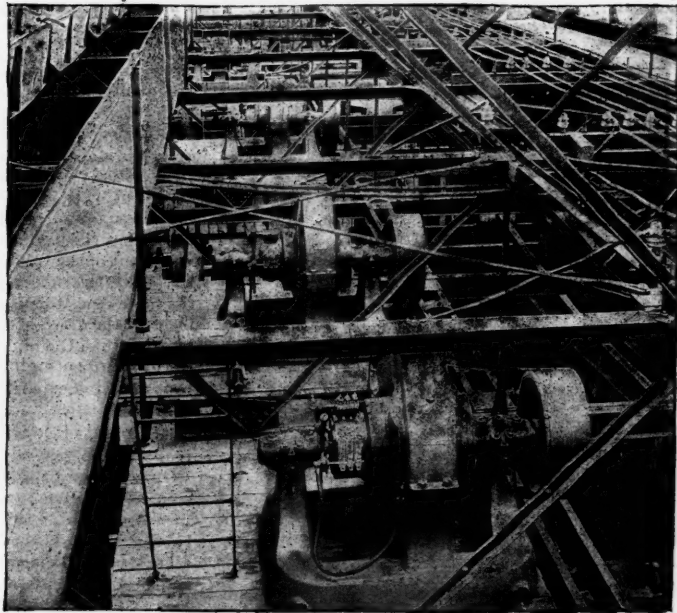
Heavy Machinery Driven by Electric Motors.

An interesting example of the use of electric motors to drive heavy machinery is found in the shops of the Farrel Foundry & Machine Co., at Ansonia, Conn. In this case the electricity is taken from water-driven generators located nearly three miles away. Previous to the development of the water power the generating plant consisted of two 75-KW. dynamos directly coupled to Ames engines and one four-pole 65-KW. 220-volt generator driven by a belt. The latter still furnishes current to three traveling cranes, while the former, during a part of the year, drives the different motors scattered throughout the shops. This plant was purchased before the Derby Gas Co. arranged with the Farrel Foundry & Machine Co. to supply it with current from its power station at the Housatonic dam, where it utilizes the excess water flowing over the dam. The Derby Company having two four-pole 200-KW. 550-volt machines, and being thus in a position to supply power, made a favor-

able arrangement with the Farrel Company. The two 75-KW. generators in the Farrel works are used for only two months in the year, the current from the Housatonic being used for the other ten months.

Both dynamos being direct current machines, and the length of the transmission nearly three miles, they are coupled in series to secure the necessary pressure, and deliver current at the brushes at 1,100 volts. At the switchboard at Ansonia the electric pressure is 1,000 volts. The distribution is carried out on the Edison three-wire system, and half of the motors in the works are so connected that each motor works on a 500-volt circuit.

In the engine-room at Ansonia there is a switchboard



Electric Motors Attached to Roof Girders—Farrel Foundry Machine Co., Ansonia, Conn.

of the panel type, arranged not only for the complete control of the motor plant operated from Derby, but also for the isolated plant of the Farrel Co. Each panel carries two motor automatic starting rheostats, with magnetic cut-out, four single pole double throw switches, so connected that any motor may be thrown on either side of the three-wire circuit. An ammeter is in circuit with each motor.

Nineteen motors of the following horse-power and speed have been put in: Three 35-H. P., 525 revolutions; five 10-H. P., 325 revolutions; five 15-H. P., 312 revolutions.

They are all of the four-pole type and for the most part located directly over the floor of the shop on platforms suspended from the roof girders. From these, the belts are taken to the shafting below whence the various machines are driven. The illustration shows six motors set on platforms in the new machine shop. They range in capacity from 10 to 35 H. P., and directly beneath them is the path of one of the traveling cranes. Other motors are attached to the wall and a few are on the main floor near the walls.

The machinery manufactured by the Farrel Foundry

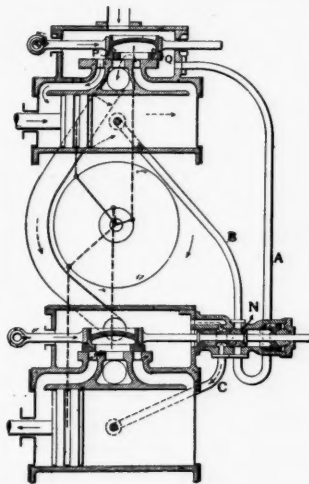


Fig. 1.

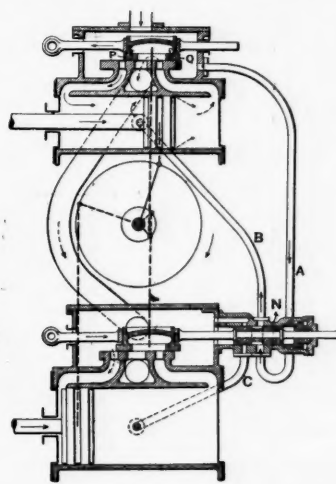


Fig. 2.

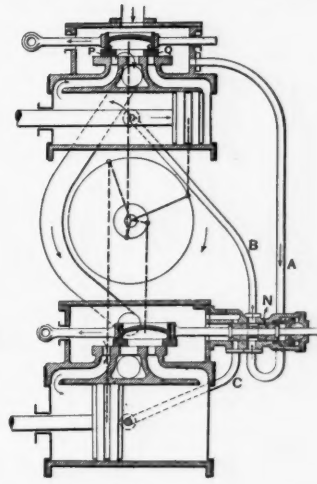


Fig. 3.

Improved Lindner System of Compound Locomotives.

and Machine Co. is of a peculiarly heavy type, and the machines driven by the motors are subjected to sudden heavy and fluctuating loads. The plant has given complete satisfaction, and no repairs either to generators or motors have been found necessary during the 18 months in which the electric motors have been in operation.

The economy resulting from the introduction of the electric motors is shown by the result obtained in the roll shop. This department was previously run by a 250-H. P. Buckeye engine, usually loaded to its full

capacity. The same rolling machinery as well as a variety of other machinery is now driven by motors taking a total power of from 125 to 150 H. P.

The entire electrical plant was furnished by the General Electrical Company, of Schenectady.

Improved Lindner System of Compound Locomotives.

The accompanying illustrations show a new arrangement of the Lindner starting valve for passenger locomotives, which differs from the former device, still used on freight engines, in dispensing with the starting cock connected with the reverse lever. There is provided, instead, a small piston valve *N*, attached to the low-pressure valve rod.

The auxiliary steam is led to the chest of this piston valve through the pipe *A* and thence through the pipe *B* to the middle of the high-pressure cylinder. Beside this, the steam from the receiver, and at starting leakage steam from the high-pressure piston, passes through the piston valve and the pipe *C* at certain positions of the cranks, to the middle of the low-pressure cylinder.

The valve *N* opens and shuts off the auxiliary steam supply in the same order, and the exhaust from the receiver in the reverse order, to that in which the low-pressure slide valve opens and shuts off the admission of steam to the low-pressure piston. The exhaust of the leakage steam is not shut off until after the admission of the auxiliary steam.

Figs. 1, 2 and 3 show what takes place at starting from the more important crank positions.

With the cranks, as shown in Fig. 1, the starting is done principally by the high-pressure piston; should the high-pressure piston or slide valve not be steam tight, then the pressure of the leakage steam on the low-pressure piston also assists the starting. The piston valve keeps the auxiliary steam supply closed, while it places the receiver in communication, through the pipe *C*, with the back of the low-pressure piston. The boiler steam which enters from the main steam pipe drives the high-pressure piston from a favorable crank position. In addition, any leakage steam which may pass over through *C* into the low-pressure cylinder drives the low-pressure piston, although at a low pressure, from a sufficiently favorable crank position up to the time when the low-pressure slide valve uncovers the exhaust port.

From the commencement of the exhaust until the opening of the steam admission port by the low-pressure slide valve, the leakage steam passes into the open air, and consequently no accumulation of back pressure on the high-pressure piston can take place.

When starting from the position shown in Fig. 2, from the opening of the steam supply by the low-pressure slide valve until the closing of the high-pressure admission port, the leakage steam passes to the low pressure piston and drives the latter. From the closing of the admission port by the high-pressure slide valve until the shutting off of the exhaust to the receiver, auxiliary steam passes to the high-pressure piston through *B*. In consequence of the large area of the auxiliary steam pipe, the high-pressure cylinder is rapidly filled with steam at high pressure. Beside this, steam passes over, through the opening *P* or *Q* in the high-pressure slide valve, to the low-pressure cylinder and drives the low-pressure piston from a crank position, which is favorable for starting.

From the position shown in Fig. 3, the starting is done by the low-pressure piston, by means of auxiliary steam. This passes to the receiver through the hollow

of the high-pressure slide valve and drives the low-pressure piston from a favorable crank position.

In consequence of the auxiliary steam supply remaining uninterruptedly open, through the absence of a starting cock, the indicator diagrams taken at every degree of cut-off are fuller both when the train is being started and when it is running slowly until a speed of 20 to 25 miles per hour is reached, when the width of the auxiliary steam admission and exhaust ports no longer suffice to allow the steam to pass and the diagrams then show that purely compound working has set in and the

effect of the auxiliary steam becomes no longer appreciable.

Compound locomotives provided with the Lindner starting device as above described have proved themselves capable of starting straight away from every crank position with maximum train load, without jerking. Also, for high-speed engines the present device has shown increased economy over the former arrangement of intercepting valve.

Locomotive Grates for Anthracite Coal.*

The Erie and Pennsylvania railroads prefer transverse cast-iron shaking grates, without water bars, on all

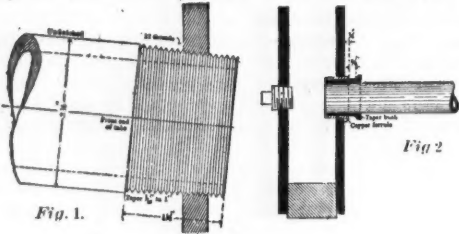


Fig. 1.

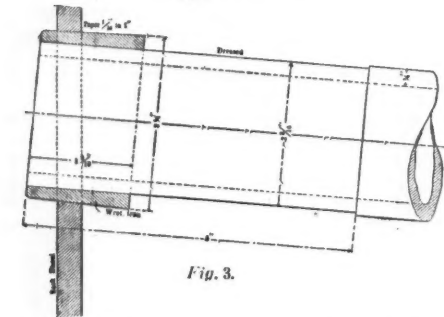


Fig. 3.

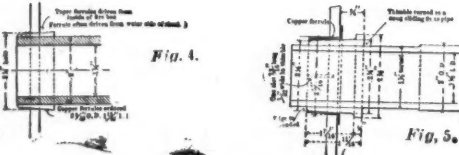


Fig. 4.

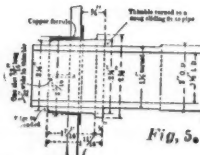


Fig. 5.

*Attachment of Tube Ends.

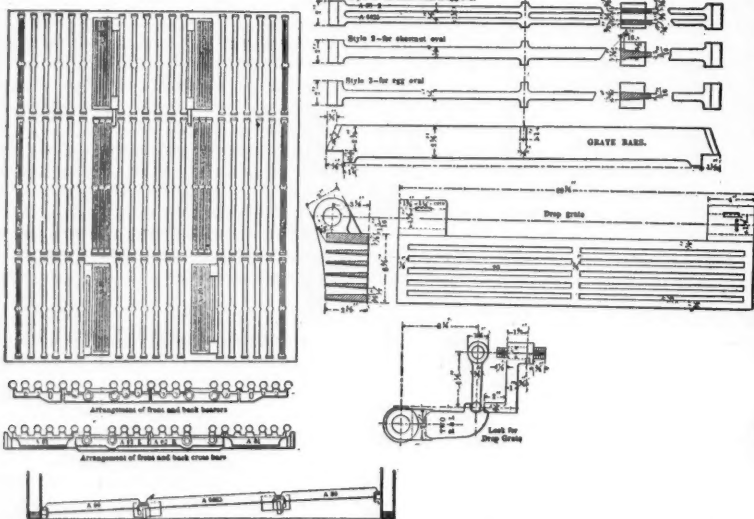


Fig. 8.—Grates, Drop Grate and Drop Grate Lock of Fig. 7.—Philadelphia & Reading, 1893

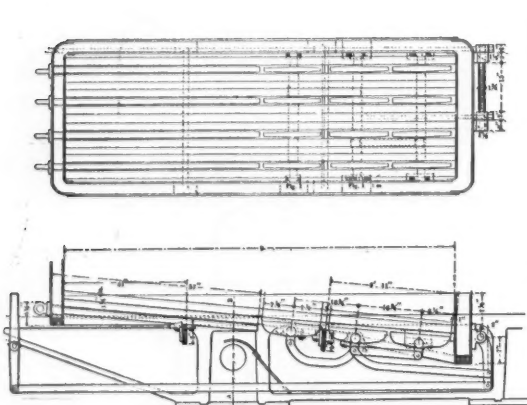


Fig. 10.—Water Tubes, with Transverse Shakers and Pull-Out Bars, for Lump Anthracite—Delaware, Lackawanna & Western.

sides, for fireboxes over the drivers. The Lehigh Valley prefers longitudinal shaking grates with one or two water tubes separating the shakers. The Delaware, Lackawanna & Western uses water tubes for fireboxes over the drivers, but prefers shaker fingers between water tubes for narrow fireboxes. The Delaware & Hudson and Philadelphia & Reading railroads prefer water tubes in all classes of locomotives.

It appeared to the committee, from the data collected, that grates should be composed wholly of cast-iron shakers for fireboxes not over the drivers. For wide fireboxes extending out over the drivers, using lump coal, transverse shakers alone, or longitudinal shakers lightened with water tubes between, are recommended. For wide fireboxes over the drivers using small coal, shakers are preferable in whole or in part.

Water Tubes.—The earlier locomotives in which at-

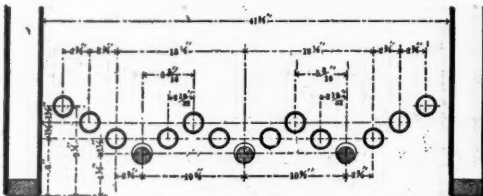


Fig. 6.—Milholland Grate—Philadelphia & Reading.

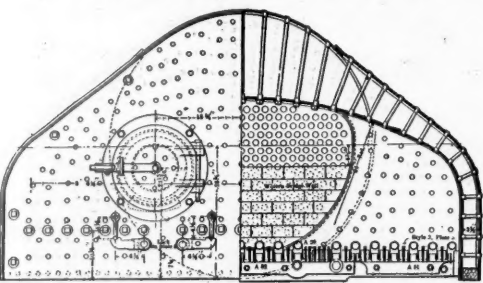


Fig. 7.—Wooten Firebox—Philadelphia & Reading.

tempts were made to use anthracite coal were rather deficient in grate area. The burning of this refractory fuel was not well understood, and the small grates compelled the use of a high-grade of coal to produce sufficient steam. This is stated by the Reading to have caused the burning out of the cast-iron grate bars then used because of the lack of ashes to settle upon and protect them. The use of anthracite was consequently not really successful until water grate bars were designed. These were put in by James Milholland from the Phila-

delphia & Reading Railroad. It is stated by this road that no further trouble was had with melting of grates. With a proper design to give sufficient pitch to secure circulation, and reasonable care as to the removal of wash-out plugs at the ends of tubes and by washing out the tubes when the boilers are cleaned, it is further stated by this road that tubes are entirely satisfactory. It is

the general experience of the Delaware & Hudson also that tubes are satisfactory if kept washed out and if the ashtrays are kept clear of hot ashes. The principal objections to water tube grates made by other roads are that unless carefully washed out they become filled with mud, and as soon as the circulation ceases they are destroyed. The first cost of water tube grates is greater than other forms, and with them it is difficult to clean the fires while running. Tubes also are unsatisfactory because of warping and splitting due to corrosion, mud and scale. The cost of maintenance is excessive, and the firebox sheets are injured by repeated caulking. It is more convenient to have tubes in narrow fireboxes than in fireboxes over the drivers as regards the removal of the pull-out bars, while a better opportunity is afforded in narrow fireboxes for inclining the tubes.

The rising of the tubes out of the fire is a common difficulty, and it is commonly attributed both to the closing of the tubes with mud and to insufficient slope, but it has been shown by the experience of the Erie road that water tubes are not self-freeing from mud and scale however great the slope. The ends of the tubes referred to were free to slip. On the other hand, buckled tubes have been taken out by the Delaware, Lackawanna & Western that have been found perfectly clean, and it has been supposed that the heat of the fire was sufficient to drive the water out of the tubes, and as the bottoms were exposed to the air, the tubes naturally sprung upward. On the same road it has been observed in fireboxes extending over the drivers, that the outer tubes are more often buckled than the middle ones, supposed to be caused by the outward springing of the mud ring at the middle, thus allowing expansion and preventing the buckling of the middle tubes.

The standard slope of water tubes varies on different roads, but in general is about 1 in. in 12 in.

On account of the length of tubes the expansion and contraction due to changes of temperature must be provided for by a slip joint as for surface condenser tubes. Fig. 1 shows the threaded front end preferred by all except the Delaware & Hudson, whose design is the same for both ends, namely, as shown in Fig. 2. There is no washout plug at the front end of the tube. Fig. 3 gives the Pennsylvania attachment with wrought iron taper ferrule, the tube being turned to permit free sliding through the ferrule. Fig. 4, with tapered ferrule, is a construction approved by the Schenectady Locomotive Works for either or both ends. The tube is not expanded and there is freedom for end motion. The Lehigh Valley drives the taper copper ferrule from the water side and does not expand the tube. The hole in the back outside head sheet is made large enough to insert the ferrule. This has given no trouble. If at any time the ferrule needs tightening, the wash-out plug can be removed and the ferrule tightened by a few light blows on the large end. Fig. 5 shows an excellent attachment, having a malleable iron taper thimble with a slot to allow compression for hugging the tube more

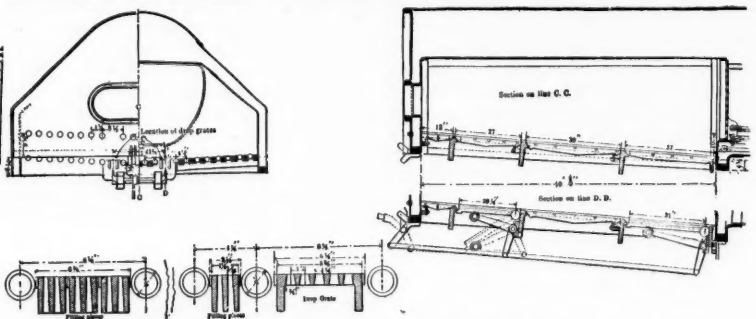


Fig. 9.—Grates for Burning Fine Anthracite. Firebox over Drivers—Delaware, Lackawanna & Western, 1895.

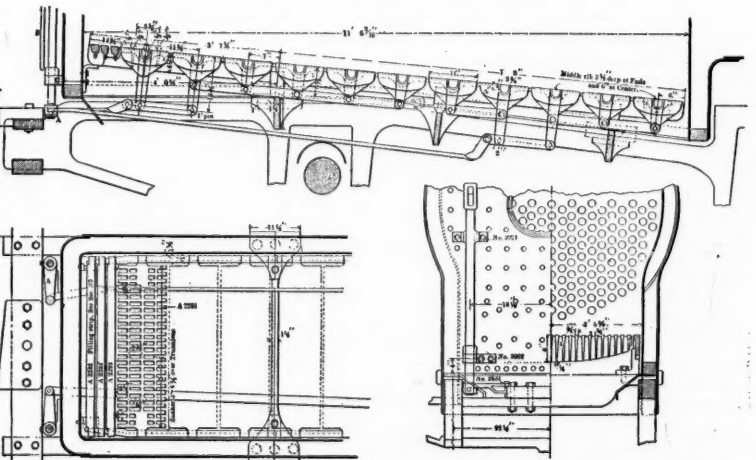


Fig. 11.—Standard Transverse Shaking Grates—Erie Railroad, 1893

classes of locomotives. The New York, Ontario & Western prefers transverse shaking grates for the central two-thirds of the grate, and water tubes along the

delphia & Reading Railroad. It is stated by this road that no further trouble was had with melting of grates. With a proper design to give sufficient pitch to secure circulation, and reasonable care as to the removal of wash-out plugs at the ends of tubes and by washing out the tubes when the boilers are cleaned, it is further stated by this road that tubes are entirely satisfactory. It is

closely. The copper ferrule is flanged over against the fire side of the plate. The tube is, of course, not expanded.

With fairly good waters there is little trouble experienced from corrosion, and also there is little trouble from the abrasion of tubes. The corrosion of side sheets is caused by an undisturbed lodgment of ashes against

*From the report of the committee of the American Railway Master Mechanics' Association, consisting of Messrs. H. Wade Hibbard, George W. West, David Brown, Edward L. Coster.

the sheet, and is particularly facilitated if there is a leak nearby; the trouble arising from this source seems to be about the same both for shaking and water-tube grates.

Pull-out bars in water-tube grates are usually in the proportion of one bar to two tubes, although the Dela-

6 and 7 ft. long; two supports for fireboxes from 7 ft. to 11½ ft. long, which may be spaced unequally if necessary to clear the drivers. In the longer fireboxes, if the front ends of the pull bars do not enter the front water leg, they should be supported there also. At the rear the thimble in the water leg through which the pull-out bar

this combination with both Wootten and plain fireboxes over the drivers. Their experience has been unsatisfactory and engines with this form of grate have been fitted with shaking grates. The objections to grates with filling pieces are that cleaning the fires is slow and difficult, the volume of cold air which enters the firebox

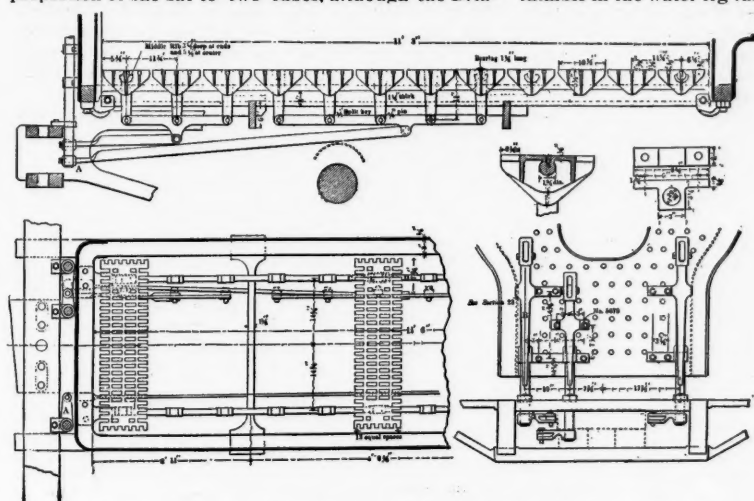


Fig. 12.—Grate Bars, with Side Bearers Underneath, Rather than at Ends—Erie Railroad, 1895.

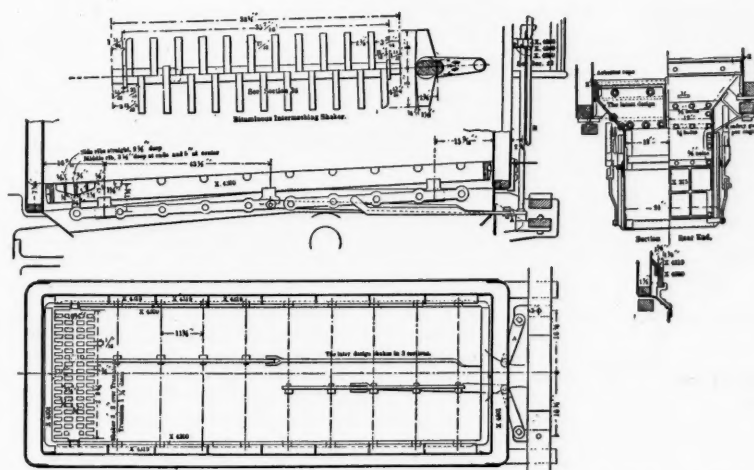


Fig. 14.—Shaking Grate for 8-Wheel Express Locomotives—Pennsylvania Railroad, 1894.

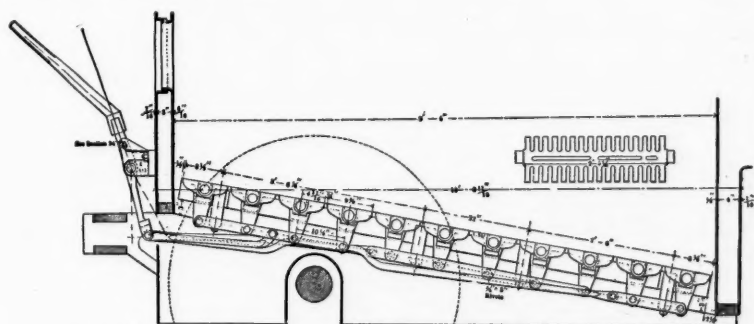


Fig. 16.—Transverse Shaking Grates, with Great Slope—New York, Ontario & Western, 1895.

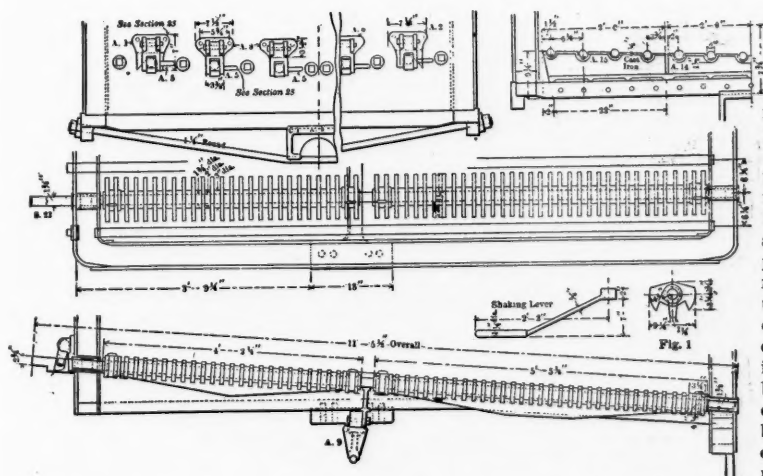


Fig. 18.—Longitudinal Shakers with Water Tubes—Lehigh Valley Railroad, 1895.

ware & Hudson uses about one to three. These bars frequently warp, bend or break, causing much trouble. Pull-out bars should not enter the front water leg.

Supports for water tubes and bars are formed by cross-braces whose ends are attached to the mud ring. The Erie railroad uses one intermediate support for fireboxes

ends. Fig. 6 shows the zigzag cross-section grate used on the Philadelphia & Reading, and in narrow fireboxes on the Delaware, Lackawanna & Western. The tube farthest from the pull-out bar should be the highest, as it admits of more readily cleaning or dumping the fire.

Tubes with Filling Pieces.—Tubes with filling pieces are illustrated by Figs. 7, 8, and 9. The Erie has used

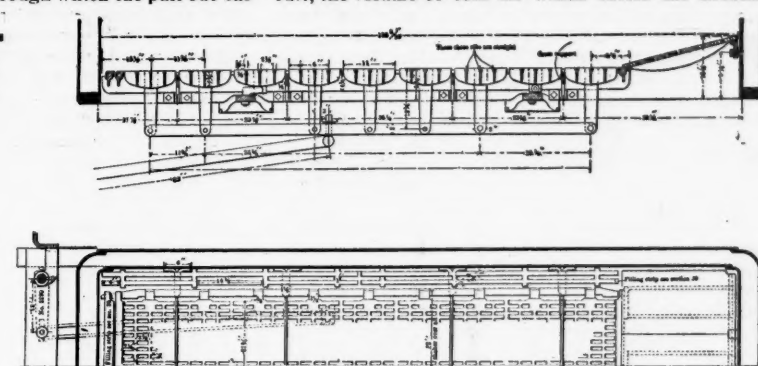


Fig. 13.—Grate with Cast-Iron S de Strips and Inclined Dead Bar—Erie Railroad, 1889.

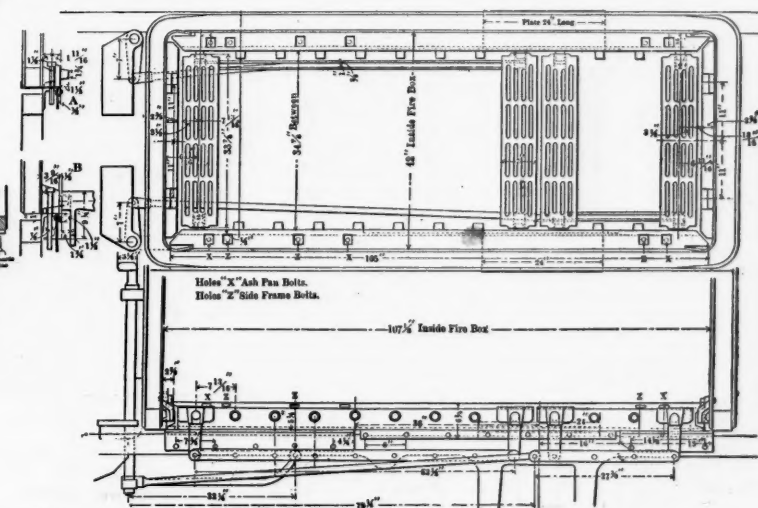


Fig. 15.—Transverse Grate, with Axial Springs—Schenectady Locomotive Works, 1896.

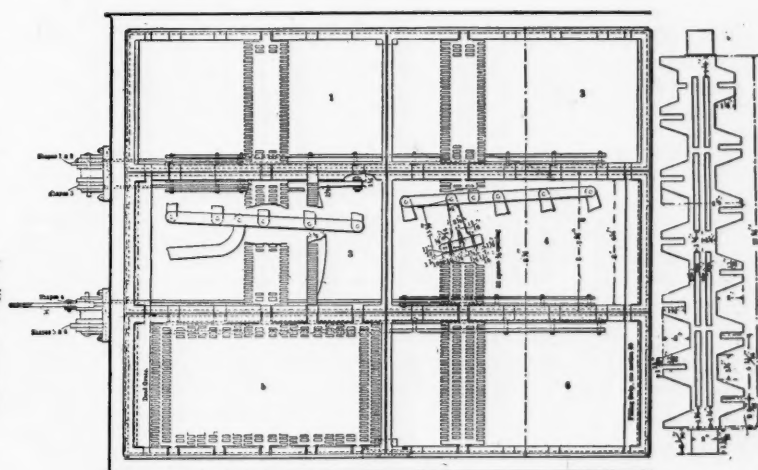


Fig. 17.—Grate for Firebox over Drivers Used for Pea or Culm—New York, Ontario & Western, 1894.

passes should be reinforced inside, as in Fig. 18, to allow for wear; or else there should be a cross-support at this point attached to the mud ring. Long fireboxes must have the mud ring braced across from side to side to prevent spreading, and this furnishes an easy means for the intermediate support of tubes and bars. To this cross-brace a cast-iron piece in one to three sections is bolted, its notched upper edges holding the tubes and bars. Wide fireboxes over the drivers require a support made light by combining a 2½-in. × 3-in. square horizontal bar with a 1½-in. truss rod having nuts at both

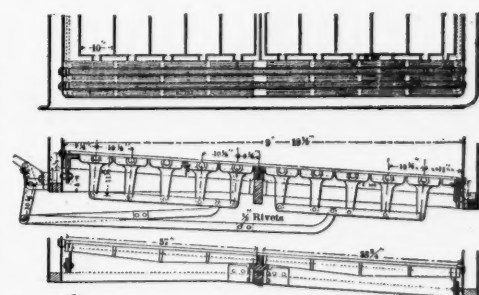


Fig. 19.—Transverse Shaking Grates, with Tubes and Filling Pieces at the Side, Firebox over Drivers—New York Ontario & Western, 1896.

when the drop gates are opened is injurious to the flues, the cast-iron filling pieces and drop grates burn off and and slaty lump coal forms large clinkers which fill the small spaces of the filling pieces and prevent sufficient air from reaching the fire for combustion. The Philadelphia & Reading, however, has used grates shown by Figs. 7 and 8 successfully.

The drop grate shown by Fig. 9 is used by the Delaware, Lackawanna & Western, and another arrangement used by the same road has the drop grate in the front two-thirds of the firebox. The New York, On-

tario & Western uses the grate shown in Fig. 9 excepting that the bell crank is connected to the drop grate by a short link instead of a roller.

Tubes with Shaker Fingers.—Water tubes with transverse shaker fingers and pull-out bars between, as shown in Fig. 10, are used successfully on passenger engines on the Delaware, Lackawanna & Western. The shaking grates occupy the front half of the firebox and have cast-iron fingers which work between the tubes. There are pull-out bars for the remaining portion of the grate. It was found that transverse shakers were not necessary throughout the entire firebox. Fig. 10 shows two methods in use for supporting the grates.

The Erie and Delaware & Hudson have used similar grates, but abandoned them on account of the short life of the fingers which came up into the fire.

Shaking Grates.—The Erie is now using shaking grates more extensively than any other road, having adopted the practice in 1890 after an unsatisfactory experience with water tubes and pull-out bars. Figs. 11, 12 and 13 show the grates used on the Erie. The principal disadvantage of shaking grates are as follows:

The greater weight of shaking grates is from four to five times the weight of water-tube grates with pull-out bars; the shakers burn out in some fireboxes over the drivers where the ashpan at the sides is necessarily shallow, which soon becomes filled with hot ashes. Shaking grates, however, have given very little trouble either from burning or warping the shakers when the ashpans are of sufficient depth and positive means are provided for bringing the grates to a level position and locking them. Locks for doing this are shown by the accompanying drawings, Figs. 11, 12, 14 and 19.

The advantages of shaking grates are as follows:

A cleaner and thinner fire, as well as a softer exhaust, can be used and on account of the large number of small openings in the grate very little coal passes through. Because of the softer exhaust the cylinder back pressure is reduced, which increases the power of the engine. The fire can be stirred from beneath while running.

Quickness and ease in cleaning fires at stops and terminals, as only one-fourth the time is required with shaking grates as is needed when water tubes are used.

Cheap coal having a large amount of refuse can be used, as the fire can be cleaned while running.

Economical use of coal due to the smaller amount dropping through the grates. The opinion of the New York, Ontario & Western has been that there was a considerable saving by the use of shaking grates over water-tube grates, under like conditions of coal, service and engine crew; but the series of tests which were carried on by the committee have not demonstrated this saving. There is more difference in crews than in grates.

Test 1 was with *slaty lump* coal upon 25½ sq. ft. of grate *between frames*, as shown by Fig. 16. The runs were 77 miles in length, with four passenger cars, at an average speed of 32.9 miles per hour. Each engineman made 10 runs with Engine 73 and six runs with Engine 78. The following are the average results:

	Engine No. 73. Shaking grates.			Engine No. 78. Water grates.		
	Crew No. 1.	Crew No. 2.	Ave. age.	Crew No. 1.	Crew No. 2.	Ave. age.
Pounds coal per car-mile.	15.7	14.	14.8	16.4	14.8	15.6
" water per pound coal.	5.1	5.2	5.15	5.	5.4	5.2
" coal used in cleaning fire.	158.	407.	432.	460.	366.	413.
Maximum boiler pressure.	100.	143.	143.	75.	75.	145.
Minimum boiler pressure.	60.	100.	131.7	124.6	126.	125.3
Average " "	131.4	132.				
Coal per square foot grate per hour, used while running.	81.	72.4	76.7	84.6	76.5	80.6

Test 2 was with *fine anthracite* upon 80 sq. ft. of grate *over drivers*, as shown by Fig. 17. Eight freight runs of 77 miles each were made by each engine at an average speed of 14.5 miles per hour. The following are the average results:

	Engine No. 165 Shaking grates.	Engine No. 152. Water grates, with cast-iron filling pieces.
Pounds coal per car-mile.	5.56	5.38
" water per pound coal.	4.56	4.43
Average number of cars.	26.	27.
Maximum boiler pressure.	157.	155.
Minimum boiler pressure.	120.	115.
Average boiler pressure.	145.9	142.8
Coal per square foot of grate per hour.	26.2	26.3

There is also less harmful effect on firebox sheets from corrosion.

Less first cost. The material alone for water-tube grates costs four-sevenths more than for shaking grates. The cost for maintenance and repairs is much less for shaking grates. Also they are of more simple construction and there are no tubes to burst, no sheets to be injured by rolling and calking and no unexpected break-downs.

The shaking grate also has an advantage in bad water districts, since the water has no effect.

Longitudinal slope of grate is generally used, although by some it is thought to be needless. It varies from ¼ in. to 1½ in. in 12 in. There is usually less slope in fire-

boxes over the drivers than in narrow ones. The width of transverse grates averages 10 or 11 in., while longitudinal grates are about 9 in. wide. The width of fingers is never less than ¼ in., and commonly ¾ in.; the latest Pennsylvania passenger engines have ¾-in. fingers used with 1½-in. openings.

Transverse Shaking Grates.—These are shown by Figs. 11 to 16 for fireboxes between the drivers, by Fig. 17 for fireboxes over the drivers, and by Fig. 19 with tubes over the drivers. It is the best practice to arrange the grates so they can be operated in sections separately.

The side bearers, which carry the grate trunnions,

The disadvantages are: Cannot shake the front and back parts of the fire separately; more difficult to renew; long sections warp sidewise; longer sections must be stronger and heavier, especially in the bellying rib; requires more locks; standard castings not so easily adapted to all lengths of fireboxes.

Fig. 19 shows the arrangement of shakers, tubes and filling pieces for fireboxes over drivers used by the New York, Ontario & Western Railway. The use of tubes and filling pieces, next the sheets, whether with longitudinal shakers or with transverse shakers, is probably the best method of overcoming the difficulty of the

TABLE II.—POUNDS OF ANTHRACITE PER SQUARE FOOT GRATE PER HOUR.

		Delaware, Lackawanna & Western		Delaware & Hudson.		New York, Ontario & Western.		Pennsylvania.
		Freight.	Pass.	Fr.	Pass.	Fr.	Pass.	Pass.
		Computed for 15 m. p. h.						
Coal, lump. Firebox, between frames	Freight....	Max.... 63 w			45 w			
		Min.... 39 w			32 w			
	Passenger....	Max.... 103 ws			75 s			Ave. 77 s 81 w
		Min.... 65 ws						
Coal, lump. Firebox, on top of frames.	Freight....	Max.... 47 w						
		Min.... 30 w						
	Passenger....	Max.... 83 ws		40 w				85 s Ave. 68 s 55 s
		Min.... 53 ws		25 w				
Coal, fine Firebox, over drivers.	Freight....	Max.... 20 wf		34 wf				Ave. 26.2 s 26.3 wf
		Min.... 9 wf		21 wf				
	Passenger....	Max.... 38 wf				46		
		Min.... 18 wf						

w = water grates only.
s = shaking grates only.

wf = water tubes with filling pieces.
ws = water tubes with shaker fingers.

are supported on the Erie by ties running across the firebox and bolted to the under side of the mud ring, as in Fig. 11. In this no strip is used across the front end of the grate to connect the side bearers. The side view of Fig. 13 shows the ties bolted to the inside firebox sheet at the mud ring. The side bearer cross-support is seen to have a thin upper edge projecting up next the fire between the shakers. Fig. 14 shows both the Pennsylvania side-bearer support resting on the upper sloping flange of the ashpan and the latest design, in which the side bearer forms the upper flange of the ashpan, and is itself bolted to the under side of the mud ring and by studs to the inside sheet of the firebox. There are also six safety guards bolted to the frames so as to slide with the expansion and contraction of the boiler. Fig. 15 is noticeable for having bosses projecting from the side bearers, upon which the grates rest; also for the support of the side bearers as seen at A and B. Fig. 17 shows the side bearers used by the New York, Ontario & Western, supported by the end bars which are borne by studs into the firebox sheets. The center is supported by a cross-tie also bolted to the sheet. Fig. 10 shows the Delaware, Lackawanna & Western side bearers as merely six detached brackets, four of which are bolted up to the under side of the mud ring.

Corrosion of the side sheets due to ashes behind the side bearings has caused some trouble, for which reason it is desirable to have the bearing bars at least ¼ in. from the side sheets at the upper edge, tapering to 1-in. clearance at the lower. The Pennsylvania Railroad's latest construction is shown by Fig. 14, where asbestos rope is used at Z.

The intermeshing of the fingers of one grate between those of the adjacent grates is not common for anthracite coal. Perforated dead plates are used only to fill out space that cannot well be covered by the shaking grates proper. Some roads recommend a drop plate at the front end when transverse shakers are used.

Fig. 17 shows the arrangement of transverse shakers over the drivers used by the New York, Ontario & Western, and is similar to the grates used by the Erie. One feature of this grate is that all parts can be taken out through the firedoor.

Longitudinal Shakers.—Fig. 18 shows the longitudinal shakers in combination with water tubes used by the Lehigh Valley R. R. on some passenger and fast freight engines. When all shakers are used there is no difference made in the design; the grates are brought almost as close together as they would be to the tube. All shakers are preferred to shakers and tubes, except as regards weight. There should never be more than two tubes together, since more will likely give a line of dirty fire not stirred up by the shakers.

The advantages of the longitudinal grate over the transverse are as follows: No side bearers to give weight and corrosion; no intricate or short-lived side-bearer supports; fewer and more simple parts, including lever connection; can be lightened by tubes in narrow fireboxes; standard castings rather more profitably adapted for all widths of fireboxes by using one or two intervening tubes, than by the filling pieces used for the same purpose with transverse shakers; easier to locate the cross-support to avoid the driver.

shallowness of the ashpan and preventing burning. The use of a combustion chamber is not generally considered desirable, as it requires cleaning often. The following table gives the opening in the grates used for different sizes of coal on various roads:

	Buck- wheat.	Pea.	Nat.	Egg.	Lump.
Philadelphia & Reading.	½ (used even for egg.)		1½	¾	
Erie.....		¾	used also for any size coal.		¾
Ontario.....	¾ to 1				¾ to 1
Delaware, Lackawanna & Western.	1				1 to 1½ (tubes and bars).
Delaware & Hudson.....		¾			1½ (between tubes).
Lehigh Valley.....		¾			1½ (shaker). 1½ (between tubes).
Pennsylvania.....					1½ (between tube and bar).

The size of coal does not affect the type of grate used but merely the size of the openings through the grate.

The depth of the fire with lump coal in fireboxes between the drivers is at first 7 or 8 in., and this gradually deepens during the run. For fireboxes over the drivers using fine coal on tubes and filling pieces the depth of the fire at first is about 2 in., which increases during the run.

The rate of combustion per square foot of grate averages less for anthracite than for bituminous, appearing much like the English rate for bituminous. The water evaporation per pound of even the best lump anthracite, when least forced, falls below fair bituminous performance.

Table I. shows the results of tests made on the New York Division of the Pennsylvania Railroad with the latest design of eight-wheel passenger engine, burning lump anthracite upon 33.24 sq. ft. of shaking grate on top of frames, as per Fig. 14.

TABLE I.

	Lbs. coal per square foot grate per hour.	Corresponding evaporation, lbs. of water per 1 lb. coal.
Maximum.....	84.8	5.82
Minimum.....	54.8	6.38
Average.....	67.5	6.08
Average number of cars.....		5.88
Average speed, miles per hour.....		45.34
Average coal per car-mile, pounds.....		8.42

For efficiency, this table should be compared with the tests made upon the New York, Ontario & Western.

For comparisons of the rate of combustion—with regard to the service, style of firebox, style of grate and size of fuel on different roads—Table II. is given. For figures under most like conditions it should be read horizontally, though on any one road it may be read vertically if it is desired to know how consumption varies with different coal and grate in the same service.

The data for the Delaware, Lackawanna & Western was taken from performance sheets of total coal per run, speed not given. The coal per locomotive mile

was, for lump, 100 lbs. maximum and 63 lbs. minimum; for fine coal, 100 maximum and 47 minimum. The coal was divided into pounds per square foot grate per mile by the following dimensions given for grate area:

	Freight.	Passenger.
Between frames.....	24	29
On top of frames.....	32	36
Over drivers.....	76	80

Pounds per square foot of grate per hour were computed for assumed speeds of 15 miles per hour for freight and 30 for passenger. The first two columns are therefore of chief value for reading vertically. It is probable that the 20 lbs. and 9 lbs. result from too low an assumed speed.

The following gives for comparison the averages of 30 Erie engines using hard and soft coal on entirely shaking grates of the same type:

	Freight.	Passenger.
Hard Coal:		
Average pounds per mile.....	122	112
Average cars per draft.....	17.3	7
Soft Coal:		
Average pounds per mile.....	120	110
Pounds hard coal, per freight car mile.....	7.05	6.06
soft.....	7	7
Average cars per draft.....	18.15	7
Pounds hard coal per passenger car mile.....	16	16
soft.....	15.07	15.07

Heavy Locomotives for the Southern Railway.

The Southern Railway Co. is having built at the Richmond Locomotive & Machine Works two 10-wheel passenger locomotives and 10 consolidation locomotives, the 10-wheelers being of extraordinary dimensions. They are all simple engines with cylinders 21 in. x 28 in. The passenger engines weigh 150,000 lbs., 116,000 lbs. being carried on the drivers. They have a heating surface of 2,492 sq. ft., and the boiler is 62 in. in diameter at the front end. We know of no passenger engines running with cylinders so large, heating surface so large and carrying so much weight on drivers.

The consolidation engines have cylinders of the same dimensions, namely, 21 x 28 in., the boiler is 61 in. diameter and the total weight of the engine 150,000 lbs., of which 131,000 lbs. are on the drivers.

A summary of the principal dimensions of the 10-wheel passenger locomotives is as below:

Weight on drivers.....	116,000 lbs.
Total weight of engine.....	150,000 lbs.
Heating surface, firebox.....	194 sq. ft.
tubes.....	2,298 sq. ft.
" " total.....	2,492 sq. ft.
Driving journals.....	8 1/4 in. x 11 in.
Truck journals.....	5 1/2 in. x 10 in.
Adhesion (at one-quarter).....	29,000 lbs.
Tractive power.....	27,468 lbs.
Hauling capacity (on level).....	4,395 tons
less weight of engine and tender.....	4,279 tons
Valves.....	American balanced
Travel of valves.....	5 1/2 in.

Certain other specifications of this 10-wheel engine are as below:

Gage.....	4 ft. 9 in.
Fuel.....	Bituminous coal
Cylinders.....	21 in. x 28 in.
Drivers.....	72 in.
Driving-wheel base.....	14 ft. 7 in.
Total wheel base.....	26 ft. 1 in.

Boiler.—Carbon steel to carry a working pressure of 200 lbs. per square inch. All horizontal seams butt-jointed; quadruple riveted with wet strip inside and out. A double riveted seam uniting waist with firebox. All plates planed at edges and calked with round-pointed tool. Extended front 21 in. long. Front course, 5/8 in. thick; slope sheet, 1 1/2 in. thick; throat sheet, 3/4 in. thick; dome course, 1 1/2 in. thick; roof sheet, 1 1/2 in. thick; back head, 5/8 in. thick. Diameter of waist at front end, 62 in. Extended wagon top with one dome, 32 1/2 in. diameter, placed on wagon top. All rivet holes punched and drilled; holes reamed after boiler is bolted together and the burrs taken off. Steel collar or saddle connecting boiler with dome.

Firebox.—Carbon steel, 120 in. long and 41 1/2 in. wide; depth, front, 75 in.; back, 60 1/2 in.; crown, back and side sheets, 3/8 in. thick; tube sheet, 1/2 in. thick. Water space, front, 4 in.; sides and back, 3 1/4 in. All sheets thoroughly annealed after flanging. Staybolts, 1 1/2 in. diameter, with 3/8-in. hole drilled from outside 1 in. deep; screwed and riveted to sheets and placed 4 1/4 in. from center to center. Firebox ring double riveted. Fire brick in firebox supported on water tubes. Radial stays, 1 1/2 in. diameter, with one end 1 1/4 in. diameter, screwed through the crown and outer shell and riveted over. The four center rows to be screwed through crown and roof sheets and to have head and washer under crown sheet. Three rows on each side of the four center rows to have nut and washer under crown sheet. The two front cross rows to be sling stays. Firebox ring to be machined inside and out where sheets are riveted to it.

Cleaning holes at corners of firebox and blow-off cock (McIntosh) on front.

Tubes.—Charcoal iron made by National Tube Works to meet company's specifications, 2 1/2 in. number, 2 in. diameter, No. 12 gage, 14 ft. 6 in. over tube sheets. Set with No. 16 copper ferrules 3/4 in. long at both ends of tubes, holes 1/2 in. larger in front than back sheet, tubes to be beaded at both ends, swayed at back end.

Grate.—Cast-iron rocking. Ash pan with upper and lower sections.

Stack.—Smokestack straight, 16 in. diameter. Deflecting plate and netting in smokebox.

Frames.—Of best hammered iron, 4 in. square; main frame in one section with braces welded in.

Throttle.—Balance valve with wrought iron dry pipe 3 in. outside diameter.

Pistons.—Cast-iron solid, steam packing Peacock break joint. Piston rods of steel. Pistons 6 1/4 in., cylinders to be made long enough for this.

Packing.—United States metallic packing on piston rods and valve stems.

Guides.—Of steel.

Crossheads.—Of cast steel tinned (H pattern) made from Southern Railway Co.'s pattern with Taylor Iron & Steel Co., High Bridge, N. J.

Driving Wheels.—Cast steel; 72 in. diameter; centers 66 in. diameter.

Tires.—Steel; 3 in. thick; flanged, 5 1/4 in. wide; plain, 6 1/4 in. wide; made by Latrobe Steel Works.

Axles.—Steel; journals, 8 1/4 in. diameter by 11 in. long.

Driving Boxes.—Best quality Ajax metal.

Springs.—Best cast steel made by the National Spring Co.

Rods.—Of O. H. Steel; main rods "I" section. Parallel rods "I" section with solid ends.

Crank Pins.—Of O. H. Steel; main journal 6 in. diameter by 6 in.; intermediate 7 in. diameter by 5 in.; front and back 5 in. diameter by 3 1/4 in.

Water Supply.—Two latest pattern No. 11 Monitor injectors.

Engine Truck.—Swing motion; with wrought iron frame; wrought iron pedestals; with approved arrangement of equalizing beams and springs.

Wheels.—McKee-Fuller steel tired spoke wheels 36 in. diameter.

Axles.—Steel with journals 5 1/4 in. diameter by 10 in. long; loose brass washer in hub of engine truck wheels next to box.

Pilot.—Of wood and provided with Jenney coupler and side springs. Pilot slats to be rounded off like Louisville South-ern.

Finish.—One boiler to be lagged with magnesia and the other with Johns' Fire Felt and jacketed with No. 21 planished iron, secured by planished iron bands; boiler to be cleaned outside and painted before jacket is put on. Inside of jacket also to be painted. Dome of one boiler to be lagged with magnesia and the other with Johns' Fire Felt and covered with sheet-iron casing and cast-iron rings, painted. Cylinders on one engine lagged with magnesia and on the other with Johns' Fire Felt, and covered with No. 16 sheet-iron casing and pressed steel head casings, painted. Steam chests cased with sheet-iron, with cast-iron covers painted. Hand rail of iron painted, with columns secured to boiler.

Engine to be provided with Golmar bell ringer; 6-in. Chime whistle; two 2 1/2-in. Coale muffled safety valves both set to 200 lbs. pressure; Leach's sanding apparatus; 18-in. Star head-light and all the usual fittings.

Tender.

Frame.—Substantially built of 9-in. steel channel. Back drawhead Janney-Buhoup 3 stem coupler and buffers.

Trucks.—Two four-wheeled center-bearing trucks; wrought iron side bars; channel iron cross beams and bolsters; Marden brake beams; journal box and lids M. C. B. Standard.

Springs.—Made by National Spring Co.

Wheels.—McKee-Fuller steel tired wheels plate pattern 38 in. diameter.

Axles.—Iron; journals 4 1/4 in. x 8 in. Brake on both trucks.

Tank.—1,500 gals. capacity.

Brake.—American brake on all driving wheels operated by air. Westinghouse automatic air brake on tender 9 1/2 in. pump. Engineer's air signal. Main reservoir to be located under waist of boiler. Brake pipes and signal to run to pilot. Brakeshoes on drivers Ross-Meehan pattern.

Bearing Metal.—Ajax metal to conform to Southern Railway Co.'s specification.

The principal dimensions of the consolidation engines are given in tabular form below:

Weight of engine.....	150,000 lbs.
on drivers.....	131,000
Grate area.....	30 sq. ft.
Heating surface, firebox.....	160 " "
tubes.....	2,049 " "

Heating surface, total.....2,209 " "

Driving journals.....8 1/4 in. x 10 in.

Truck journals.....5 1/2 in. x 10 " "

Adhesion at one-quarter.....32,750 lbs.

Tractive power.....34,663

Hauling capacity (on level).....5,450 tons

less weight of engine and tender.....5,332

Valves.....American balanced

Travel of valves.....5 1/2 in.

The specifications of the consolidation engines are almost identical with those of the 10-wheelers. The few points of difference are as below:

Driving Wheel Base.—15 ft. 6 in.

Total Wheel Base.—23 ft. 6 in.

Weight on Drivers.—131,000 lbs.

Firebox.—102 3/4 in. long; 41 1/2 in. wide; depth front, 68 1/4 in.; back, 65 1/4 in.

Tubes.—271 in. number; 14 ft. 3 in. over tube sheets.

Guides.—Of O. H. steel.

Driving Wheels.—Cast steel; eight in. number; 58 in. diameter; centers turned to 52 in. diameter to receive tires.

Axles.—Steel; journals 8 1/4 in. x 10 in. long.

Driving Boxes.—Of steel cast iron (25 per cent. O. H. steel plate).

Rods.—Main rods of the best O. H. steel; "I" section. Parallel rods of O. H. steel rectangular section with solid ends.

Engine Truck.—Swing bearing, two-wheeled. Truck boxes cast iron. Bearings brass with soft lining. Truck equalized with front drivers.

Tender Wheels.—Double plate chilled wheels 33 in. diameter.

A Compound Locomotive with Auxiliary Cylinders.

A novel locomotive, built for the Bavarian State Railroad by Krauss & Co., of Munich, in 1895, has recently been described and illustrated in *Engineering*, London. From that description, we condense the following notes:

In designing this two-cylinder compound locomotive, the builders sought to combine, with the single pair of drivers, the greater tractive force which four-coupled engines afford in starting and ascending grades; while further, they desired to secure a more perfect adaptability of the engine to the various requirements, concerning speed and power, that arise under working conditions. Large cylinders, quite desirable for great power at low speed, give unfavorable results at high speeds. If the customary two cylinders are adhered to, it is hence necessary to keep down their dimensions. The design adopted by Messrs. Krauss & Co., enables them to adapt the size of the cylinders to the conditions obtaining for high speed; while for low speeds, they bring an auxiliary engine into use.

The main frame of the locomotive is internal, the cylinders of both engines and their gears being outside. The axle of a pair of trailing wheels, however, has its bearings in a short outside frame. The main drivers are

73.2 in. in diameter, the high-pressure cylinder is 15.16 in. in diameter and the low-pressure cylinder is 24.01 in., the cylinder ratio being 1 to 2.51. The stroke is 24 in. The cylinders are inclined 6 in 100, because the auxiliary cylinders to be described later had to be placed underneath. The valves are American balanced slide. The valve gear is of the Hensinger-Walschaert type, and the cut-offs are the same on both sides.

The starting gear consists of a Lindner cock, which is connected with the reversing rod, and which at full gear allows the steam to pass from the boiler to the receiver, and of a Krauss interruption slide, which, fixed outside of the high-pressure cylinder and worked from the right-hand link, prevents the passing of steam at those positions of the crank, when the pressure in the receiver would only impede the starting.

The auxiliary engine, which is the special feature of the locomotive, is entirely independent of the main engine, and is fitted with two cylinders 11.4 in. in diameter and 18.1 in. stroke. These cylinders are bolted to the lower side of the main cylinders, and have their valve chests on the outside. Under ordinary conditions the auxiliary engine does not run, being intended for use only when a heavy pull is needed, that is on starting and on steep grades and hence its wheels are kept up off the rails and remain stationary. The auxiliary driving wheels are the same diameter as the trailing wheels, namely 39.3 in. The auxiliary driving axle has its bearings in horn plates, which are riveted to both sides of the main frame just in front of the main drivers. This axle has not the ordinary bearing springs, but is connected with the springs of the main driving axle in such a way that these springs tend to lift the auxiliary axle from the rails and press its bearings against the upper stops. Normally, therefore, the auxiliary driving wheels remain 1.2 in. above the rails.

When the auxiliary engine is required to work, the auxiliary driving axle is depressed by the piston of a vertical steam cylinder 16.2 in. in diameter, fixed above its middle. The piston with its ball and socket joint and bronze footstep bears against a cast-steel support fixed between two plates which connect the bearings. Steam is admitted to this cylinder through a three-way cock placed on the right side of the dome.

An arrangement of levers between the auxiliary axle bearings and the bearing springs of the main driving axle serve to equilibrate the load when the auxiliary axle is lowered, in such a way that it is distributed over the running wheels. When the auxiliary wheels are pressed down the whole engine is raised about 1 in. on the springs; but at the same time, because the front links of the springs of the main driving axle are depressed about 2 in., the deflection of the springs, and consequently the load upon them, remain unchanged. The springs are hence slightly inclined in under both conditions. When the auxiliary axle is lowered their front end lies a little lower, when the axle is suspended a little higher, than the other end.

When the auxiliary engine is out of use, the weight available for adhesion amounts to 14.85 tons. When the auxiliary axle is pressed down, an additional adhesion weight of 14.82 tons becomes available, thus giving a total adhesion weight of 29.67 tons.

In order to render impossible any mistakes on the part of the engine-driver, such as giving steam to the auxiliary engine before putting it under load or releasing it again before shutting off steam, the throttle handle and the shaft which operates the three way cock have been made mutually interlocking. This arrangement, however, permits of the auxiliary engine being run idle—that is to say, when the throttle handle is in a certain position a slot made in the cover of the small throttle slide is so far open that, provided the main engine be in motion and its throttle likewise open, a sufficient amount of steam can pass to start the auxiliary engine, still in the raised position, so that it may run idle at about 150 revolutions. With the auxiliary engine running thus, the handle to the three-way cock can be operated, and the auxiliary axle can be pressed down. This precaution has been adopted with the object of avoiding all jerks in starting the auxiliary engine with the locomotive in motion. Likewise the pressure cannot be taken off the auxiliary axle before the throttle is closed to the position corresponding to idle running. In this way all racing owing to faulty manipulation is prevented. The use of the auxiliary engine is limited to starting and getting up speed after slow runs and helping up grades, which, on the whole, confines the duplex working to about five per cent. of the total track length.

In most other respects the locomotive is of the usual construction employed on the Bavarian State Railroad. The main engine is a two cylinder compound. In general, the arrangement of wheels is the same as that of the "Atlantic" type of locomotives, the front pair of drivers which is worked by the auxiliary engine, however, being only a little over one-half the diameter of the rear or main drivers.

Rapid Transit in New York.

The Appellate Division of the Supreme Court in New York has announced the appointment of three commissioners to take testimony and to report to the Court whether or not the new rapid transit route, as last planned by the rapid transit commission ought to be constructed. The commissioners appointed are Arthur D. Williams, John Sabine Smith and Algernon S. Frissell. We judge that this is a commission which will ascertain and tell the facts with discretion, and without fear or prejudice.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Major Symons, Corps of Engineers, U. S. A., has made a report on the matter of a ship canal from the Great Lakes to the sea, which apparently sheds some actual light on the subject. So far we have seen only abstracts that have been given to the daily press, but these indicate that Major Symons has looked at the matter from the standpoint of a trained and responsible engineer and not from that of a promoter or an enthusiast. We beg his pardon for even this slight suggestion that this last might have been possible. In the first place he concludes that the best route for a ship canal is by way of the Niagara River, Lake Ontario, Oswego, Oneida Lake, the Mohawk and the Hudson, and that this would cost \$200,000,000. He expresses the further opinion that the building of such canal is not a project worthy of being undertaken by the general government. He is of the opinion that the Erie Canal when enlarged under present plans would, with the restrictions imposed by the state removed, give all the commercial advantages of a ship canal. Still further, if this canal should be enlarged to take 1,500-ton barges and the line changed to give a continuous descent from Lake Erie to the Hudson, canalizing the Mohawk, such an improved canal, navigated by barges of large capacity, would permit freight to be transported between tidewater and the Western lakes cheaper than by ship canal navigated by large lake or ocean vessels. This we are quite prepared to believe and shall look with considerable interest for the analytical figures from which Major Symons draws the conclusion. This great improvement of the Erie Canal he considers worth the undertaking of the general government, and that it could be made for about one-quarter the cost of the ship canal, say \$50,000,000. It must be remembered, however that these estimates are very rough, and that it is not supposed for a moment that available knowledge permits an accurate estimate. The cost of the necessary surveys for a ship canal by the Niagara-Oswego route is estimated at \$190,000. The cost of an independent survey for the enlargement of the Erie Canal is estimated at \$125,000.

The merchants of New York have become so enthusiastic over their reduced-rate excursion for buyers from the interior, which the Joint Traffic Association has promised them, that they are asking for similar reductions from everywhere—Florida, Texas and the ends of the earth. From being the slowest town in the country, trusting to her past success for everything, New York has come to be as aggressive a hustler as Chicago or Denver, if we may judge by the way the local newspapers give prominence to the utterances of the officers of the new Association. Promise of an annual revenue of \$8,000 for the Association is already secured, and as there is little to do but "whoop'er up" in the newspapers and send letters to the traffic associations, this sum will probably provide motive power for a good deal of enthusiasm. The other cities are somewhat frightened. Philadelphia, Baltimore and Chicago have already

acted and Boston has called a meeting. We think it perfectly safe to assure them that whatever discrimination between cities may be caused by special passenger rates will be very quickly righted. The talk about violation of the Interstate Commerce law is all bosh. Evidently the chief ground on which the other cities have allowed themselves to become jealous of New York is the feeling that the railroads have by long and urgent solicitation been induced to grant to the metropolis a great favor, and that, in the nature of things, such favors will not be given out very often or very liberally; once given out the next applicant must expect to be turned away. There is no likelihood that such is the case. The railroads have made low rates about like this before. Merchants have taken advantage of Christian Endeavor, or Grand Army, or seashore excursions and have traveled at half-price year after year. Often, perhaps generally, the railroads make money by these reductions, and, therefore, are as ready to grant them to one city as to another, under similar circumstances. Whenever the merchants, or anybody else, can get several hundred persons to start out at the same time they may be pretty sure that the railroads will give them substantial reductions.

The people of George Stephenson's race have not kept railroads to themselves, but so far they have a long lead of the rest of the world in constructing them. There is not much room in Great Britain for a great mileage, and in Europe, of the total 155,384 miles, only 20,977 miles are on British territory. But of the 26,890 miles in Asia, 19,700 miles are on such territory, in Africa, 2,845 miles out of 8,169; in America, of the 48,005 miles outside of the United States, 16,719 miles are British, and, of course, all the 13,888 miles in Australia. Altogether, there are 74,129 miles of railroad in the British possessions, which, added to the 181,717 miles in the United States (all the figures are for 1895) makes the considerable figure of 255,846 miles, which is nearly three-fifths of the railroad of the world. And this takes no account of the 7,127 miles of Mexican railroad, all built with American and English capital and skill, and nearly all with their materials, nor of the countless lines built elsewhere in the four quarters of the globe with English money and skill and mostly with English iron and machinery. We seem to be pre-eminently the railroad race.

Mr. Midgley, Chairman of the Board of Commissioners of the Western Joint Traffic Bureau, thinks that the railroad officers responsible for making freight rates in competitive territory out that way would do well to bother themselves less about obeying the law and give more attention to making reasonable agreements with their competitors for regulating competition and putting a stop to blind and wasteful rate-cutting. He has written a letter to the roads of the association, concerning the recent reductions on lumber from Wisconsin, where one road tried to increase its differential by reducing rates two cents, only to be followed by the others, thus necessitating a second reduction, all to no profit. In the letter Mr. Midgley says:

"No improvement, but, on the contrary, accumulated losses, may be expected so long as members are more solicitous not to exceed their prerogatives as citizens than they are to properly administer and protect the properties entrusted to their care. The groundlessness of some of these fears finds a pertinent illustration in the attitude of certain parties on the question of arbitration. The Trans-Missouri decision pronounced against agreements between railroad companies which are in restraint of trade. A relation of rates which prevents a given community from fairly competing with a rival locality is a restraint upon trade, hence to remove such incubus would not conflict with, but, on the contrary, would enforce the spirit of that decision. Then, again, the third section of the Interstate Commerce Law prohibits common carriers from unduly discriminating against any locality, and in case of complaint it is made the duty of the commission to investigate, and to require the removal of the unjust discrimination. Therefore it cannot be unlawful for railroad companies, by recourse to arbitration, to remove restraints upon trade and unjust discriminations perpetrated by means of unfairly adjusted tariffs, when the failure to redress such wrongs will subject the companies continuing them to the punishment prescribed in the act to regulate commerce. The decision of the Supreme Court was clearly intended to promote competition, whereas the maintenance of a relation of rates which stifles that element of trade in one community in favor of a rival locality is an injury which common carriers will never be punished for removing in the manner advocated by the most enlightened spirits of the age, namely, by resort to agreements to arbitrate. Civilization is too far advanced for any respectable tribunal to pronounce against that principle when the object of its exercise is to mitigate evils and deal fairly between individuals and communities. . . ."

Mr. Midgley's reasoning is all right, and it is true that as long as the railroads scrupulously observe their duty to obey the law, as interpreted by the highest judicial tribunal, they are likely to lose money; but he forgets that the Supreme Court has thrown overboard the rule of reasonableness, as ap-

plied to such statutes as the anti-trust law, and takes the words of the act literally; and the citizen has no better prerogative to disobey the law now than he had before. Railroad lawyers will be rather cautious about accepting Mr. Midgley's word for it that fears of incurring the displeasure of the United States Supreme Court, by disobeying its plain command, are groundless. It is true that the Court has voted itself, five to four, into a tight place, from which it will have to extricate itself some time, unless Congress amends the anti-trust law, but it is not likely that outside advice will hasten matters. To talk about the spirit of the law is a waste of words, for four judges presented that argument at the time Justice Peckham's decision was approved, but without effect. They emphasized the truth that the letter killeth while the spirit giveth life, but there were five judges who thought differently.

Civilization is, indeed, too far advanced for the highest court in the land to disapprove the substitution of orderly competition for disorderly; but the obstinate fact of Justice Peckham's decision outweighs the dictum of Mr. Midgley; and unfortunately there is a large body of our citizens, especially in the West, who seem to be sufficiently uncivilized to look upon the anti-trust law as an instrument of justice. They believe that the normal way for the railroads to compete for lumber in Wisconsin is to make alternate reductions in transportation rates (first one road and then another) until the tariffs are 50 per cent. below cost by all roads. The argument that the railroads ought to make a living has, with these people, about the same force as a dream. There are plenty of this kind of men in Congress, as well as on the farms, and they are even now proposing, aided by Eastern Senators who ought to know better, to pass an anti-trust law that shall be more effective than that of 1890. Mr. Midgley's appeal to the third section of the Interstate Commerce law is as futile as his attempt to reason with the Supreme Court. The third section does, indeed, forbid discrimination; but instead of accepting the version set forth in the above letter, let us get Mr. Morrison, Chairman of the Interstate Commerce Commission, to interpret it. He would brush aside all attempts to produce harmony among two or more railroads and remind us that the mandate of the law is addressed to each individual railroad by itself. He and the makers of the anti-trust law care nothing how much discrimination may exist by reason of discrepancies between the rates of different railroads, for the road which is charging the higher rate will naturally make a reduction so as to compete with the other road. The discrimination in Wisconsin is partly or wholly of that kind, and it cures itself in a way which is beautifully simple and which, in the eyes of the Populist, is just the way that the law is intended to act; the rates by all lines rapidly tend to fall to cost or below cost. There is nothing in the Interstate Commerce law (except the requirement of a three days' notice of reductions in rates, and that is not much), to forbid the most rabid rate-cutting. Nothing, we mean, in the specific provisions of the act. There is the power of the Commission to investigate and to expose illegitimate competition, but it has never yet amounted to anything, except perhaps in rebuke of ticket scalping; and the clause under which this body might perhaps do some good, that empowering it to denounce rates which are unreasonably low, as well as those unreasonably high, has never been acted upon except in the supposed interest of the shipper. Possibly the chief effect of this paragraph may be to secure us the first prize as pessimists, but it seemed worth while to note the fact that the Supreme Court decision cannot be reversed in a moment, and the other fact, which ought to be well known, that the Interstate Commerce act is of no value whatever as a support for reasonable traffic agreements between competing railroads.

The Right to Seize Coal in Transit.

An acute phase of the miners' strike was reached in Cleveland July 12, when the Lake Shore & Michigan Southern seized a quantity of coal in transit, billed to various consignees in that and other cities, avowedly for the purpose of supplying its own engines. As a matter of first impression, the proceeding is quite generally denounced as arbitrary and high-handed. But careful investigation of the principles that underlie the subject will reveal the legality of the transaction.

It must be borne in mind that the railroad officers taking this coal are the responsible conservators of quasi-public corporations—of corporations that by the explicit terms of their charter are required to perform certain public functions and to conserve certain pub-

lic interests on pain of corporate death in case of failure to so perform. Again, their charter rights expressly confer upon them that principle of sovereignty known as the right of eminent domain, a principle that is the direct offspring of another principle, that of public policy. Here we have the dual action of agencies that are equal to the demands of almost any emergency, because they can find both the right and the justification in the imperative necessities of the case. "The rights of necessity are a part of the law." And when the use is public, the necessity or expediency of the appropriation is not a subject of judicial cognizance.

Again, it is an error to assume that the right of eminent domain pertains exclusively to real property, and can only be vitalized by the preliminary proceeding known as condemnation. On the contrary, it is a far-reaching right, extending to every species of property, except, perhaps, money, and covering a wide range of circumstances. Assuming that the use be public, and that the fifth constitutional amendment is satisfied by "due compensation being made," the expediency of its exercise is a question to be determined solely by the railroad officers themselves. The courts may decide as to whether the use is public or private; but right there their province ends. If they find that the appropriation is for a public use, the officials alone determine the necessity of its exercise. Should a legal controversy grow out of the action of the roads in this strike, it will be found that the railroad lawyers will ground their defense upon an elaboration of these ideas touching the law of public policy, and the right of eminent domain.

The seizure of this fuel must be assumed to have been absolutely necessary. Without fuel the company cannot move its cars or deliver a pound of freight. To bank the fires and cease operating an important railroad has far-reaching results, with possibilities of disaster to hundreds of thousands of people. Shut off the food supply of St. Louis for a single week; cut off all communication with the interior for even half that time, and we have deplorable results. Even the old common law era countenanced extreme measures in cases of actual necessity, and all the publicists of Europe have sanctioned a similar rule. Something might be said of custom and usage as upholding the acts of the railroads in this matter, as it is a fact that for 50 years they have been doing this same thing. But the right rests upon a far higher ground.

The matter of damages will probably be easily settled. Under the circumstances of the Cleveland case, as published, we believe that the Lake Shore is right in making this seizure, and that the Court will confine the measure of damages in every instance to the actual market value of the coal when taken. It is very unlikely that it will indulge the consignees in any "speculative theories" as to damage arising from the stoppage of their plant. Such damages are too remote for judicial consideration. Neither can they be shown to be the proximate cause of the injury; that was the strike itself; or, possibly the failure of the contracting mine owners to supply the railroad. In any event, the seizure of the coal by the company while in transit is not the proximate cause.

These views are not in harmony with the popular opinions, but they are sustained by such a formidable array of legal authority that we are constrained to abide by them until some court of last resort has ruled against us. Those wishing for advanced information on this highly important topic will do well to consult Cooley's Constitutional Limitations, 523; Puffendorf, bk. 2, ch. 6; Rice, Modern Law of Real Property, 842; Bowditch v. Boston, 11 Otto (U. S.) 16; Kohl v. United States, 91 U. S. 371; Fort Leavenworth v. Lowe, 114 U. S. 531; Mississippi, etc., Boom Co. v. Patterson, 98 U. S., 406; Respublica v. Sparhawk, 1 Dall., 357, 362; see also, Mouse's Case, 12 Rep. (Coke), 63; 15 Vin., tit. Necessity, Sec. 8; Cast Plant Co. v. Meredith, 4 T. R., 794; Am. Print. W. v. Lawrence, 1 Zab., 248; 3 Zab., 591; Stone v. Mayor of N. Y., 25 Wend., 173; Russell v. Mayor, etc., of N. Y., 2 Den., 461.

The M. C. B. Pocket Strap.

At the recent convention of the Master Car Builders' Association the Committee on Automatic Couplers made two recommendations, the second being, "That the design of pocket strap, included in the Recommended Practice of the Association and shown in Sheet B of the 'Proceedings' for 1896, with a radius of $\frac{1}{4}$ in. at inside back corners, be made a standard by the Association."

The discussion which followed the reading of this report was published in the *Railroad Gazette* June 18, page 436, and arose from a difference of opinion

as to whether it was advisable to turn down the ends of the coupler yoke, as shown on Sheet B of last year's "Proceedings." Several prominent members favored straight ends for the yoke, the reasons being that this construction was sufficiently strong and cost less where the work had to be done in small shops. Others opposed straight yoke ends because $\frac{1}{4}$ -in. bolts might be used by mistake, in making repairs, instead of $1\frac{1}{2}$ -in. rivets, and also there was danger from poor riveting, in which case the straight yoke would likely fail. However, it is not clear how the M. C. B. standards could be held accountable for the failure of work not done in accordance with them. The motion to omit the turned-down ends from the M. C. B. yoke was not carried.

The pull on the draft rigging of freight cars is of two kinds, the steady pull due to the resistance of the train, and the sudden pulls due to the jerks of the engine, and the jerks caused by short variations in grade. No satisfactory data have been obtained from road tests to determine the amount of these forces brought on the draft rigging, but very complete laboratory tests of the strength of couplers under a steady pull were made in 1893, at the Government Arsenal at Watertown, Mass., by the Master Car Builders' Association. These results were published in the M. C. B. "Proceedings" for 1893 and in the *Railroad Gazette*, July 21, of the same year. In these tests it was found that for a few couplers tried, the pull required to break ranged from 70,000 to 100,000 lbs., but that the far greater number failed under a steady pull of from 125,000 to 150,000 lbs. A few failed under a greater load, but 150,000 lbs. can safely be taken as the maximum limit for the best design of vertical plane couplers, and 100,000 to 125,000 lbs. is about the average for most couplers in service.

The determination of the constant load which couplers will stand is only of value in comparing one coupler with another, as in service couplers are broken not under steady pulls, but by sudden jerks. The effect of jerks is difficult to calculate, but it is known that with very rough handling couplers and draft rigging have been broken that will stand 120,000 lbs. There is, however, little reason for handling trains so roughly that the jerks exceed the strength of draft gear and couplers capable of standing 90,000 lbs.

The chief value of laboratory pulling tests of couplers and draft rigging is that it is possible to find out the weakest part and where the failures can be expected to occur in service. If repeated tests show that the coupler fails before the end attachment, it is not only poor engineering, but a waste of money to increase the strength of the attachment.

The Chicago, Burlington & Quincy has had a long experience with coupler yokes having straight ends, and it has found that both in the laboratory and in service the couplers fail before the straight yoke fastening. This subject was carefully investigated in the laboratory at Aurora, Ill., in 1887 and 1888.

In 1887 a test was made of a Potter cast-iron drawbar and end attachment, consisting of a 1-in. \times 4-in. straight end yoke held by two $1\frac{1}{2}$ -in. rivets, being similar to the present M. C. B. recommended practice, with the exception of the yoke ends. The object was to test the end attachment, and the failure occurred under a load of 152,000 lbs. by the rivets shearing. The casting also broke between the rivets. Numerous other tests made with similar drawbars and attachments showed that the cast-iron drawbars failed at from 100,000 to 110,000 lbs., while the yokes were not injured.

These laboratory tests enabled the C. B. & Q. to decide that the straight 1 in. \times 4 in. yoke with two $1\frac{1}{2}$ -in. rivets was stronger than the couplers. Since this time the strength of couplers has been increased as shown by the tests at the Watertown Arsenal. To bring his work up to date Mr. Rhodes made two pulling tests, June 29 last, to determine if turning down the ends of the yoke increased the strength where steel couplers were used.

In the first test a No. 3C Williams steel coupler was used, with a 1 in. \times 4 in. yoke, having the ends turned down, fastened with two $1\frac{1}{2}$ -in. rivets. This coupler broke at 131,800 pounds by shearing the lock. The yoke, rivets and bar itself remained intact, while a small crack developed in the knuckle.

In the second test a Columbia steel coupler was used with a 1 in. \times 4 in. straight end yoke held by two $1\frac{1}{2}$ -in. rivets. This coupler broke at 151,600 lbs. by shearing the coupling-pin, the yoke and rivets being uninjured. The coupler also developed a slight crack in the upper lugs. While these tests did not show which of the two forms was the stronger fastening, they did show that the straight end fastening was stronger than the coupler, and therefore strong enough.

We quote the following from a letter written by

Mr. Rhodes, which brings out very clearly the point we wish to emphasize:

"The engineer or mechanic who makes a structure stronger than is needed spends more money than is necessary. He is not much different from the man who makes his structure too weak. The only difference is that in one case his error does not bring disaster, while in the other it does. The designer, however, is guilty of an error in either case.

"Sometimes, in designing machinery, making a part too strong not only brings about an unnecessary expenditure of money in the first place, but it may afterward prove expensive. For instance, in designing and attaching a cylinder head it is quite important that it be strong enough not to break under ordinary conditions, but it must never be stronger than the cylinder. If it is stronger than the cylinder when something fails and the parts have to give way, if the head is the stronger part, the cylinder breaks and a new cylinder has to be applied at great expense. If the cylinder head is strong enough, but not so strong as the cylinder, then the head breaks without damaging the cylinder and it can be replaced at a trifling expense.

"It seems to me that at the Old Point Comfort Convention this fact was not considered, and that the men advocating the unquestionably strong construction of the turned down ends of pocket strap, overlooked entirely the fact that there is no necessity for the additional strength and expense."

Mr. P. J. Flynn, Joint Agent of the Western Passenger Association at Denver, reports that during the month of June he received for deposit the return portions of 900 Sebastian tourist tickets from the East, and that not one such ticket found its way into the hands of the brokers, although the Denver market was tested twice each week and 16 tickets of all kinds were obtained. It appears that the scalpers fight shy of the Sebastian ticket. Although they had difficulty in getting all the tickets they wanted in June, they did not try to buy any of these. The peculiarity of the Sebastian ticket, which was devised by Mr. John Sebastian, General Passenger Agent of the Chicago, Rock Island & Pacific, and on which he has applied for a patent, is that the return portion is sent directly from the starting point to the joint agent at destination and the going portion, or that part of the going portion which is left in the hands of the passenger, has nothing upon it to show where it was sold or to what destination the returning portion reads. One of these tickets, including stubs and one coupon, is 20 in. long. It is double width and divides lengthwise. There are separate contracts on the going and on the returning portion, but the purchaser signs only the returning portion. The "punch photograph" appears on the returning portion only and, as already stated, the name of the issuing station and the date of sale do not appear on the going portion except on the coupons. These checks naturally make the business of speculating in the ticket somewhat risky. There is a stub to be taken up by the first conductor and returned to the Auditor, and three other stubs, one for the agent, one for the agent to send immediately to the Auditor and one for the joint agent at destination.

It appears that some of the railroads of the Michigan Passenger Association have felt obliged, after all, to make low rate round-trip tickets to points south of the Ohio River and to points west of the Mississippi, in spite of the vote of the Association a few weeks ago not to issue home-seekers' tickets. Competing lines outside of the Association made reductions and it became necessary to meet this competition. A funny incident in connection with this Association vote was the statement, made by some reporter, that the reason the roads refused to make home-seekers' rates was their fear that an undue stimulation of emigration would result, thus depleting the population of Michigan and causing a shrinkage in railroad traffic. On the strength of this fiction, philosophical editors with a historical sweep of mind have sagely moralized on the happy evidence, hereby disclosed, that the war is past; that Northern people are disposed to go South to fill up the country, and that a railroad which is so short-sighted as to try to obstruct the movement is a wicked offender against a high social law. In point of fact, the movement never promised to be large enough to amount to anything, and up to the present time the entire revenue from the sale of the reduced rate tickets is said to have been less than was spent for printing the special forms. But the conclusions of an editorial often give forth a fine sound when the premises are as unsubstantial as an eggshell.

The ticket scalpers of Nashville are making a hard fight for existence. We have recently noted the action of the City Council of that city in requiring the delivery of a certificate with each ticket sold by a broker, and, later, the action of the Nashville, Chattanooga & St. Louis in securing an injunction restraining outside agents from selling non-transferable tickets over that road. The Southern Railway has now secured a similar injunction, and although the scalpers succeeded in finding a criminal court judge who held the city ordinance void and released, on writs of habeas corpus, those who

had been arrested for violating the ordinance, the railroads seem to be keeping up the fight with good courage. It is to be hoped that they will never relax their grip. The excursion tickets to Nashville are non-transferable and the illegality of buying or selling them outside of the ticket office is, therefore, almost self-evident. If, therefore, the railroads have secured sufficient evidence to induce a judge to grant a temporary injunction, it is fair to presume that they will succeed in showing that the prohibition should be made perpetual. A dishonest scalper deserves no mercy under any circumstances, and the only excuse that honest ones ever have for dealing in non-transferable tickets is the action of the railroads themselves in disregarding their own rules. It appears that the roads centering in Nashville do not do business in that lawless fashion, and we may expect, therefore, that if the local magistrates are not too weak-kneed, some good result may be accomplished by the present agitation.

Receiver Felton, of the Cincinnati, New Orleans & Texas Pacific, who comes out with something new nearly every week, has notified his employees that the Railway Officials' and Employees' Accident Association of Indianapolis will issue policies of insurance upon the conductors, engineers, firemen, brakemen, bridge carpenters, signalmen, yardmen and foremen in his employ, at the regular rates of the Association, and that the road will, until further notice, provide 45 per cent. of the premium as long as the employee remains in its service. This would seem to be a very simple arrangement, and, if the rates are reasonable, highly commendable, as far as it goes. Railroad employees of the classes named need life insurance and sick insurance as much as accident insurance, if not more; but a Receiver, operating a railroad only temporarily, would hardly be warranted in establishing a complete relief department like that of the Baltimore & Ohio or the Pennsylvania. As accident insurance alone does not meet all the wants felt by the employees they will continue to keep up their brotherhood insurance organizations, and thus expend their energies in maintaining two sets of machinery. It is to be hoped that Mr. Felton's arrangement will in due time be expanded into a thorough and complete organization. The relief departments of the larger roads named (as also those of the Burlington and the Reading) continue the excellent records that they have shown now for 10 or 15 years, no criticism of any consequence being heard, except a little now and then from the labor agitators, who dislike anything that promotes harmony between railroad companies and their employees.

The North Carolina Railroad Commission (or, rather, two of the three Commissioners) last week, in an opinion filed with the decision refusing to further reduce freight and passenger rates in that state, as asked for in a written address by Governor Russell and Justice Clark, of the State Supreme Court, give a review of the rates which have prevailed in past years in that state. In the year 1891, when the Railroad Commission was created, a consolidated report of all the roads operating in North Carolina showed the average passenger rate to have been 2.88 cents a mile; and the average freight rate per ton per mile, 1.66 cents. Now the average passenger rate is 2.21 cents, and the average freight rate 1.39 cents. Over 10,000 persons are employed by railroads in North Carolina, to whom are paid in wages annually \$3,545,890. For renewals of rails and ties, locomotives, passenger and freight cars, fuel for locomotives, train supplies, etc., the railroads pay annually in the State \$3,043,163. The Commissioners conclude by saying: "From the above-mentioned facts and others at the disposal of the commission, we see no good reason for changing the views expressed in our last communication to the Governor, and we now reiterate that the present rates are just and reasonable, and as low as in other states of like population per square mile, if not lower; and we decline to make any material changes at present."

The sudden death of Clarence S. Anthony, Auditor of the Fitchburg Railroad, at Boston last week, was made the occasion of a sensational story in the *Boston Herald* to the effect that a conspiracy had been discovered among officers and agents of the road whereby a large amount of money had been stolen from the company; several hundred thousand dollars. It appears that an investigation of the accounts of the company is being made by outside accountants, and that the work will take several weeks, but the officers of the road deny that they expect to find evidence of any embezzlement. There seems to be a suspicion that the present story has some connection with the charges made some months ago by an employee of the freight department of the road in Chicago, who was discharged. Vague reports of the alleged irregularity were published at the time this clerk was discharged and it was said that the evidence which he professed to be able to give related to rebates paid on shipments of grain to Europe. Some of the gossips say that the only wrong-doing in connection with these rebates was the violation of the Interstate Commerce law, or of traffic agreements, or both; others profess to believe that the rebates paid out of the railroad treasury were larger than those actually received by the shippers.

The official report of the railroad authorities of Germany shows that at the beginning of the present fiscal year, April 1, 1897, there were open for public traffic in

the whole empire 29,586 miles of railroad, an increase of 455 miles within the year. Of the whole mileage 19,837 miles were classed as "main road;" and of this 9,853 miles were double-track road; while there were 29 miles of three-track and 55 miles of four-track road. Of the 9,749 miles of railroad of "subordinate importance," 801 miles were narrow-gauge railroad, the additions to which amounted to 3¼ miles during the year. But besides the above lines, which are common carriers, there were in the empire 1,941 miles of private lines (not common carriers), of which 421 miles were narrow-gauge, and the length of the narrow-gauge private railroads decreased 35 miles during the year, while that of standard-gauge private railroad increased 70 miles.

NEW PUBLICATIONS.

The Entropy-Temperature Analysis of Steam Engine Efficiencies. With a blank diagram arranged for easy application to any concrete case. By Sidney A. Reeve, M. E., Adjunct Professor of Steam Engineering at the Worcester Polytechnic Institute. New York: Progressive Age Publishing Co.; 20 pages; price with diagram, 75 cents; diagram separate, 25 cents.

This book treats of what may be regarded as a new method of analyzing heat engine efficiencies; not that the subject itself is of recent origin or conception, but its application to practical problems has not been taught or generally understood until within a few years.

The subject of "entropy, what it is and how to make use of it," is first considered. In his attempt to present a physical conception of entropy the author begins by stating the conditions necessary for obtaining power from a stream of water. By analogy he applies the same idea to the conditions necessary for obtaining power from steam, and leads the reader up to the simple analytical expressions, and defines entropy as "that property of a body which remains unchanged so long as no addition or subtraction of heat is made from without. In reality it is the property of heat in a body." Thus the reader begins to learn something about entropy, but we question if the conception will be clear to most students. This is not the fault of the author, but rather of the subject itself, there being in a very true sense no such thing as entropy, any more than there is such a thing as the moment of inertia. While both of these terms express a relation which may be understood perfectly in each case, yet so far as we have been able to understand the subject, neither can be conceived of either as a substance or as a thing by itself.

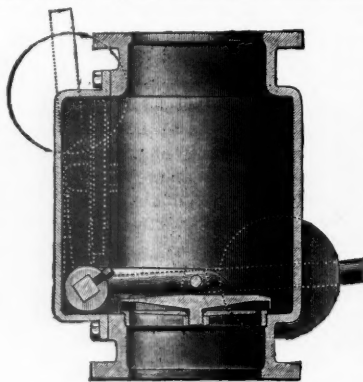
After a general introduction to the subject, we are led to apply the principles appearing in the first few pages. The diagram which is appended is a reproduction in the main of Professor Boulvin's diagram, published in *Engineering* (London), Jan. 3, 1896, but so modified and enlarged as to be of service to engineers, when the explanations in the book are understood. The notation and nomenclature is in accordance with Professor Ewing's "Steam Engine and other Heat Engines."

It would be impossible to give briefly a complete explanation of this scheme of analysis, but it may be well at least to say that the area traced by any entropy-temperature diagram measures in *heat units* the work done during that particular cycle, while in the ordinary indicator diagram the work is measured in *foot pounds*, or its equivalent. The complete diagram which accompanies the explanation is divided into four sections or quadrants by rectangular axes of co-ordinates. Of these axes the right hand horizontal one measures volume; the lower vertical one, pressure; the left hand horizontal, temperature, and the upper vertical, entropy. Therefore, we obtain relations between two different quantities (as volume and pressure) in their respective quadrants.

This is a subject of more than passing interest, and engineers are indebted to Professor Reeve for presenting the matter clearly and concisely.

TRADE CATALOGUES.

The Jenkins Brothers' Improved Valves.—Under the above title, Jenkins Brothers, of 71 John street, New York, issue an 80-page catalogue descriptive of their various types of valves that are now in extensive use. Valves of every description, together with many details, are extensively illustrated and their prices for all sizes are given. Special attention is directed to the "ex-



celsior," straight-way, back-pressure valve illustrated here with. Although of recent invention, the simplicity of this valve has already commended itself to engineers. It has no dash pots, springs or complicated levers, can be thrown in and out of use instantly, and works equally well in any position in which it is placed. Other specialties, as the Sellers re-starting injector and the Jen-

kins pump-valves, durable packing and washers made for special work, are included among the descriptions. The catalogue contains an index that adds much to its usefulness as a reference book.

The Russell Snow Plows.—The Ensign Manufacturing Company, Huntington, W. Va., and 11 Pine street, New York City, issues a pamphlet describing the Russell snow plow for 1897 and 1898, and suggesting that orders should be placed now to get ready for next winter's blizzards. Of course, the reader knows what the Russell snow plow is. The fundamental idea is the "power bar," by which the push of the engine behind is carried directly to the prow of the snow plow and is not transmitted through the frame. This "power bar" is hinged near the front, thus enabling the snow plow to adapt itself freely to curves and irregularities of motion and greatly reducing the liability to derailment in a drift. This is the controlling feature of the device, which has, however, other important minor points. This snow plow is shown in the Ensign Manufacturing Company's pamphlet as built for single or double track and of several different sizes. A flanger, to be worked by compressed air or by hand levers, is also shown. A list of railroads using the Russell plows is given, together with a number of letters from superintendents and chief engineers endorsing the same.

The Cloud Steel Truck Co., Old Colony Building, Chicago, has issued a catalogue containing the description of the Cloud Steel Truck and the Bettendorf "I" Beam Bolster. These are fully illustrated by numerous engravings made from photographs and line drawings.

Westinghouse Gas Engines.

The Westinghouse Machine Co. has issued a pamphlet describing the gas engines which that company is now putting on the market. It has been well known for a long time that the Westinghouse Machine Co. was carefully working to perfect a gas engine which should be so efficient, simple, durable and cheap in first cost as to warrant the company in undertaking its manufacture and sale on a large scale. With that end in view the work of design and experiment has been carried on, at the expense of the company, however, and not at the expense of the purchaser. Engineers have been sent to Europe to make themselves familiar with gas engine practice there. The company has built engines from 5 H. P. to 250 H. P. (one of 750 H. P. is now building) which have been run under severe conditions, watched and tested, and it is now believed that the Westinghouse gas engine can be offered to the purchaser with the same confidence as the Westinghouse steam engine.

There is no standard commercial rule on which to base the rated power of the gas engine. The Westinghouse company has established a rating which bears about the same relation to the ultimate brake horse power as the rated power of the steam engine bears to its ultimate capacity; that is to say, the rating represents 80 to 85 per cent. of the maximum brake-horse power developed in the test. This enables the engine to take care of over-loads and to compensate for variation in the quality of the gas.

In general, the Westinghouse engine embodies the most important mechanical features of the Westinghouse steam engine. It has the same upright, self-contained construction and the same method of lubrication. The smaller engines have two cylinders and the larger ones three. The pistons are of the trunk pattern connected with the crank in the same way as the pistons of the Westinghouse steam engine. Indeed the external view of these two engines is very much the same.

The gas is ignited by an electric spark and on engines of 15 H. P. and upward there are double igniters in each cylinder. Only one of these is working at one time, the other being held in reserve.

With engines too large to be started readily by hand a simple air compressor and air storage tank is furnished. The compressor can be run by hand to charge the tank for the first time, after which it is run by a belt from any convenient pulley or shafting. A pipe from the tank leads to one cylinder of the engine, in which pipe is a valve, arranged to be opened and closed at each revolution, the opening occurring just as the crank passes its upper center. The motion of a lever on the crank case sets the exhaust valve on this cylinder so that it opens on every return stroke of the piston instead of every other stroke as when the engine is in normal operation. A turn of a screw cuts the admission valve of the same cylinder out of operation. Thus, one cylinder of the engine is converted into a compressed air motor without disturbing the functions of the other cylinder. By this arrangement the engine can be started and run until explosion takes place in the other cylinder. The stop valve is then closed, the inlet and exhaust valve set again to work in the regular manner and the engine is in full operation.

The Westinghouse gas engines operate on what is commonly known as the Otto cycle. On the first outward stroke the piston draws in a charge of the explosive mixture, which is compressed on the return stroke. As the crank passes the center, the charge is ignited and expansion takes place on the next forward or working stroke. During the succeeding return stroke the burnt gases are expelled, leaving the cylinder ready to repeat in regular order the same series of operations. The single acting piston receives in consequence only

one impulse for each four strokes, or each two revolutions of the crank. By the use of two cylinders alternating the working strokes of the pistons, this engine receives an impulse at every revolution. A sensitive governor regulates the amount of the explosive mixture admitted for each charge, in proportion to the load on the engine, giving an impulse at every revolution whether running fully loaded or entirely light. On this account, for smooth running and steady speed, the claim is made that it is equaled only by the best steam engines, and these essential and desirable qualities are obtained without overloading the shaft with fly-wheels.

A Himalayan Railroad.

The April 30 issue of *Engineering* (London) contains a description of the Darjeeling Railroad, a line running between Siliguri and Darjeeling, in British India. The article is illustrated by a two-page plate, showing the reverse curve at Gyabari, loop No. 3 at Choonbati, loop No. 4 and an engine and train.

The railroad, which is 51 miles long, climbs from a height of 398 ft. to one of 6,812 ft. above the sea level in that distance, passing on its way a summit of 7,407 ft. The steepest grade on the line is 1 in 23 for a short distance, while there are nearly four miles of 1 in 28.70, which is preceded by about 7½ miles of 1 in 28.77. The gage is 2 ft. The road is worked entirely by adhesion, the locomotives used weighing 14 tons each, being capable of hauling trains weighing about 36 tons more.

To a large extent the line has followed an old cart-road up the mountains, but in several places, in order to get a more moderate grade, it has departed from the highway. At such places the usual devices found on mountain lines for keeping down the grade are used. Thus, there are four switchbacks and there are several loops. Loop No. 3 is particularly interesting, as the road all but makes two complete turns. Loop No. 4 is built with a radius of only 60 ft. There is a number of curves with radii not over 70 ft., while at one place in a distance of 1,400 ft. there is an alternation of curves and reverse curves of eight in all. The radii of four of these are but 70 ft., while the easiest of them all has a radius of only 150 ft.

The rolling stock is not carried on bogie trucks. The passenger cars are 13 ft. long, 6 ft. wide and 7½ ft. high above the rails. They have wheels 19½ in. in diameter and the floors are set very low.

The total cost of the road has been about \$17,500 a mile. In the mountainous district the bridging was not very heavy. Near the junction of the road with the main line at Siliguri is a bridge of seven spans, of 100 ft. each, over the Mahanuddy River. Financially the line succeeds, paying 10 per cent. to its stockholders.

Australian Railroad Notes.

Victoria and New South Wales together have about three-fourths of the total population of the Australian continent, though they occupy less than a seventh of its area, in the extreme southeast corner. The two large cities of Australia, Melbourne and Sydney, are here, and the two colonies may be likened in their relations to the whole of Australia, to New England and the middle states in their relations to the United States in the first half of this century, though they have an immensely greater area—397,000 square miles against 171,000. New South Wales alone has 309,000 square miles, with 1,278,000 inhabitants and 2,614 miles of railroad, or a mile to 490 people (here a mile to 385). All but 84 miles of its railroads are state railroads, and these earned in 1895 an average of \$5,426 gross and \$2,440 net per mile, the latter 3.44 per cent. on the capital invested.

South Australia adds another to the demonstrations that it takes people as well as land to support railroads. With an area of 380,000 square miles—equivalent to Arkansas, Louisiana and Texas together—it has but 352,000 inhabitants, and 1,721 miles of railroad—a mile to 205 people. Part of the roads are of 5 ft. 3 in. and part of 3 ft. 6 in. gage. Their gross earnings in 1895 were an average of \$2,698 per mile, which was about 3½ per cent. less than the year before. The working expenses absorbed 59 per cent. of the earnings, leaving \$1,052 of net earnings per mile, which was 3.1 per cent. on the capital invested. The first railroad in the colony was opened in 1856. Since that time the net earnings of the whole system have lacked about \$8,000,000 of meeting the interest charges. The colony has one railroad in its tropical "North Territory," extending from Port Darwin southeastward 147 miles to Pine Creek. It just earned its working expenses in 1895. This North Territory is two-fifths larger than South Australia proper, but in 1891 was credited with less than 5,000 inhabitants.

Tasmania, which when some of us studied geography was called "Van Diemen's Land," is about 200 miles from the Australian mainland, south of Melbourne. It has an area of 42,420 square miles (as large as Virginia) and 162,000 people. Railroad building began there 20 years ago, and at the end of 1895 it had 419 miles of state railroad and 55 miles of private railroad. The gross earnings of the state railroads in 1895 were at the rate of \$1,738 gross and \$343 net per mile. The net was at the rate of ½ per cent. on the money borrowed to build them; the year before it was ⅓ per cent. The private railroad earned \$1,130 gross and \$480 net per mile, and this was 2.86 per cent. on the capital, for it cost only \$16,764 per mile.

New Zealand has 104,817 square miles of territory (a fifth more than Great Britain and similar in climate, or

as much as our four "Middle States"), 698,700 inhabitants, and at the end of March, 1896, 2,013 miles of state railroad and 167 miles of private railroad, or a mile to 306 people. The earnings of the state railroads in the last year were \$2,860 gross and \$1,044 net per mile, and the net earnings were 2½ per cent. on the capital invested. One of the private railroads earned more than six per cent. Another is being built for a land grant. The colony has a great future, apparently, but like the Australian colonies has been going too fast and is suffering a reaction such as only new countries know.

TECHNICAL.

Manufacturing and Business.

The Mexican Government has given a contract to Siemens & Halske, to put up electric light poles and other electrical equipment in the City of Mexico. All materials and machinery will be imported by the contractors from Germany free of duty.

It is reported that an electric light plant is shortly to be installed in the mines of the Rogerston Colliery Co., Limited, between Pretoria and Pietersburg, South Africa. It is expected that a number of American companies will bid on a part of the equipment.

The E. P. Allis Co., Milwaukee, Wis., has received an order from the Central London Underground Railway, London, England, for six cross compound engines of 1,300 H. P. each. These engines, which will be of the same type as those used in the power-house of the Baltimore & Ohio tunnel, in Baltimore, Md., are to be delivered within a year.

The Warren City Boiler Works, Warren, O., is adding to its equipment new punches, shears, hammers and rolls. The company has a number of large contracts on hand.

The Milner Coal & Railroad Co., of Birmingham, Ala., has increased its capital stock from \$200,000 to \$500,000 and has acquired 6,000 acres of mineral lands near New Castle.

J. J. Golman, formerly General Manager of the Allentown (Pa.) Traction Co., has been appointed Agent for the St. Louis Car Co., of St. Louis, Mo., and not Eastern Sales Agent of the St. Louis Car Coupler Co., as was recently announced in this column.

The gas plant of the Saratoga Gas, Electric Light & Power Co., of Saratoga, N. Y., is being rebuilt and rearranged. A contract has been given to the Berlin Iron Bridge Co., of East Berlin, Conn., for the steel work connected with the roof of the generator house, and of the cold storage building. These roofs are steel trusses covered with corrugated iron.

The Union Car Co., of Depew, N. Y., has leased the shops of the Schuylkill Navigation Co. at Reading, Pa., and proposes building a foundry and other buildings at that place to make chilled car wheels. The plant will be in charge of R. E. Coleman, who is also General Superintendent of the company's works at Depew. It is reported that the contract for the foundry, which will be 100 ft. x 150 ft., will be let at once. The proposed capacity of the new plant is 400 wheels a day.

The South Tacoma (Wash.) plant of the Griffin Wheel Co. is to be improved and enlarged; new cupolas, engines, boilers and fans will be put in, and it is expected that the capacity of the shops will be brought up to 100 car wheels a day.

The Hall Signal Co. has a contract for the erection of automatic block signals on about five miles of the Canadian Pacific at Montreal.

Iron and Steel.

Mr. H. F. Holloway, President of the Akron Iron & Steel Co., of Akron, O., states that the plant, which was destroyed by fire July 4, will be rebuilt as soon as the insurance is adjusted.

On July 18, mills 6, 7, 8 and 9 of the W. Dewees Wood Co., at McKeesport, Pa., resumed after several weeks of idleness. It is expected that other departments will resume shortly.

The Lebanon rolling-mill, at Lebanon, Pa., was sold July 17 by Sheriff Reuben Stine to Richard Meily for \$38,600.

The Monongahela Tin Plate Works, at Pittsburgh, Pa., started up in full on July 13, employing about 600 men.

No. 4 furnace of the Sloss Iron & Steel Co., at Birmingham, Ala., has been blown in. The other two furnaces of the company at Birmingham are being repaired, and it is expected that they will soon be blown in.

The Belmont Iron Works, Philadelphia, Pa., has been incorporated with a capital stock of \$25,000. The incorporators are: S. G. Brown, Joseph B. Willits, H. B. Hirsch, Henry Carlisle, Walter W. Pharo, A. B. Hirsch, Samuel Ashhurst, L. E. Pharo, Charles L. Huston and J. P. Willits.

No. 1 furnace of the Bellaire Steel Co., at Bellaire, O., was blown in July 8. It is expected that No. 2 furnace, now being relined, will remain idle until about Sept. 1.

Proceedings have been begun by William B. Broomall and J. H. Roop, trustees for the bondholders of the Wellman Steel Co., to foreclose the mortgages against the property. It is expected that the plant will be sold next fall. The bonded debt of the company consists of \$100,000 first mortgage bonds, \$200,000 second mortgage bonds, both paying 6 per cent., and \$300,000 5 per cent.

bonds. The interest on the first named bonds has been in default since July 1.

The Midvale Steel Co. is building a one-story brick laboratory building 26½ ft. x 59 ft. at its plant at Nicetown, Pa. The cost will be about \$5,000.

New Stations and Shops.

The Cleveland Terminal & Valley has prepared plans for a new passenger station at the foot of South Water street, Cleveland, O. The building will contain waiting rooms, ticket offices and also the general offices of the railroad company. The street front will be of ornamental brick and it is proposed to have at least four tracks under roof. It is expected that the cost will be about \$125,000.

The Atchison, Topeka & Santa Fe is building a new passenger station at Dodge City, Kan. The building will be of brick with red and white stone trimmings. The foundations are now about finished.

Interlocking.

The National Switch & Signal Co., Easton, Pa., has recently closed a contract for an interlocking plant at the crossing of the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy, at East Ottumwa, Ia. The machine will have 19 working levers and one spare space and all home signals will be connected by pipes.

The National Switch & Signal Company, Easton, Pa., has closed a contract for an interlocking plant at the Fairfield, Iowa, crossing of the Rock Island and the C., B. & Q. This plant will have 27 working levers and five spare spaces, with pipe connections to home signals.

Locomotives in Russia.

Official statistics of the stock of locomotives in Russia, Jan. 1, 1896, show the whole number to have been 8,123. Of the freight engines, 3,736 were 6-wheeled, 2,542 8-wheeled, 55 12-wheeled, 2 10-wheeled, and 22 4 wheeled. Just one-eighth of all the locomotives were compound engines. Nearly one-half (4,020) were built in Russia. Of the whole number, as many as 45 per cent. were built before 1880. The fuel used was coal on 40 per cent. of the whole number, petroleum on 32 per cent. and wood on 28 per cent. Peat was used on 53 engines. The locomotives fitted with power brakes number 1,131, of which 702 had the Westinghouse brake, 217 the Hardy, 105 the Wenger, while the other 107 had various other kinds.

Electric Capstans.

A recent issue of the *Revue Generale des Chemins de Fer* publishes an article by M. E. Sartiaux, giving a description of the electric capstans in use on the Northern Railroad of France for shifting cars. The capstan is placed in an angle between the tracks, where a hauling rope can be easily led either to the turn-tables or the cars on the adjacent tracks. The motor is of a horizontal type and the armature shaft is geared directly to the capstan's spindle. The whole is very carefully protected from water, and no trouble has been experienced in this direction. Within the cavity containing the motor there are the rheostats and other appurtenances usually connected with such mechanism.

Chicago Track Elevation.

Work was begun last Monday morning on the elevation of the tracks of the Pittsburgh, Fort Wayne & Chicago, in Chicago. The contract has been given to the joint corporation, the Morris Construction Co. and the Chicago Ballast Co.

Pig-Iron Production in June.

The *Iron Age*, in reviewing the pig-iron production for June, states that the net result of a number of changes in furnaces working during that month is a moderate decrease in the current production. On July 1 145 furnaces were in blast with a weekly capacity of 164,064 gross tons, as against 146 furnaces in blast June 1 with a capacity of 168,380 gross tons. The furnaces blown in during June were: Wharton in New Jersey, one Pennsylvania Steel Co.'s furnace at Steelton, one Duquesne furnace of the Carnegie Steel Co. in the Pittsburgh District, Riverside at Wheeling and one Hubbard in the Mahoning Valley. The Illinois Steel Co. has started one of its Bay View furnaces. The furnaces blown out during June were: One of the Sharon Iron Co., one Bellaire in the Wheeling District, the Lebanon Valley furnace and one of the Illinois Steel Co., at South Chicago. The current production of charcoal iron is smaller than it has been for several years.

Water Tube Boilers in Fast Ocean Steamers.

At a recent meeting in London of the International Congress of Naval Architects and Marine Engineers, Mr. P. Sigaudy presented a short paper on "Water Tube Boilers for Fast Ocean Steamers." He laid down a scheme for building a steamer with such boilers. It is proposed to install 23,000 actual H. P., or a capacity for perhaps 28,000 H. P. on trials. This would be supplied by 16 double-ended boilers of the Normand-Sigaudy type. The boilers would carry a pressure of 220 lbs. per square inch. The total grate area would be 1,520 sq. ft., and the total heating surface about 74,400 sq. ft. The tubes would number 27,200, each 7 ft. 8 in. long and 1½ in. external diameter. The total water volume would be 5,216 cu. ft.; total steam volume, 2,752. The saving in weight as compared with cylindrical boilers of the same capacity would be about 762 tons for boilers only, but the engines could be made smaller because of the high steam pressure.

Roller Bearings.

The advantages of using roller bearings for light cars was recently discussed in a paper by William B. Marshall before the Institution of Civil Engineers. He states

that experiments with the cars using roller bearings show that on a grade of 1 in 20, 23 per cent. less power is required in starting than with the common type, and on a grade of 1 in 40 it was 50 per cent. less, and on a grade of 1 in 80 it was 60.4 per cent. less. It is further stated that the corporation of Blackpool has placed roller bearings on some of its cars, and the consulting engineer of the road reports a reduction of 30 per cent. in the axle friction. The Liverpool Overhead Railway began experimenting in 1895, and is also placing these bearings on its rolling stock. Among steam roads the records given also appear to be remarkably good, as in the case of the Brighton & Kemptown Railroad, which reports that an experimental train of six passenger cars which had been running for two years shows a saving of 12½ to 15 per cent. in coal consumption.

Lubricating Car Windows.

Stevenson, Bro. & Co., 132 South Second street, Philadelphia, Pa., are introducing what is known as cabinet wax for use on car windows to facilitate raising and lowering. The wax is simply rubbed on the edges of the window sash, on the frame and in grooves in which the sash slides. Among the railroad companies using this wax are the Pennsylvania, Lehigh Valley, Lake Shore & Michigan Southern, Illinois Central, Delaware & Hudson Canal Co., and Louisville & Nashville. The Philadelphia Traction Co. also uses it for street car windows.

The Duty on Tires and Wheels.

The Midvale Steel Co. has, on previous occasions, expressed its very decided objection to being "protected." Now there appears in the press a spirited letter from that company protesting against the action of the American Steel Association. The company was informed that the increased rate of duty on tires and wheels in the Senate bill was brought about by the demand of the Midvale Steel Co., through the American Steel Association. The company wrote at once to the manager of that association, saying: "It seems to us incredible that your attorneys or your association should have acted in our name, who were not members of the association, without any authority from us, and we might add in direct defiance of our well-known and well-expressed wishes on the subject." No answer to this appears in the correspondence which has been published. The Midvale Company also wired at the same time to Mr. McAleer, Member of Congress from Pennsylvania, saying: "May we ask you to see at once every member of the Conference Committee to protest in our behalf against the use of our name in this matter? The railroads have enough taxations and burdens to carry without any addition in the shape of an increased duty on tires, and we protest against any such increase being made." The Midvale Company concludes its published letter as follows:

We have taken the position that the interests of our patrons are our interests, that the railroad companies of this country have been mulcted on all sides; they have been subjected to taxation which they should not have been put under; their powers of earning a profitable return on the amount of their capitalization by pooling, and by making such other freight arrangements as seemed best to their management have been curtailed by the interstate commerce bill; they have been subjected to penalties which no branch of industry or manufacture would have supported, and we maintain that the action of Congress in keeping the present duty on tires or in increasing same is unwise and unpatriotic, because:

(1) It subjects the railroads to increased taxation by compelling them to buy their tires from makers in this country.

(2) It deprives the country of such amount of revenue as would otherwise come to it from the duty on imported tires.

THE SCRAP HEAP.

Notes.

A steam canal boat, towing three transports, has made the trip from New York through the Hudson River, Erie Canal and Lake Erie to Toledo, O., and back, about 1,600 miles, in 22 days 19 hours, a record of which the captain is said to be very proud.

The Canadian Pacific steamship "Empress of Japan" on her last trip westward crossed the Pacific Ocean from Victoria, B. C., to Yokohama, in 10 days 3 hours 44 minutes, making the average speed 17.3 knots an hour, the distance being 4,217 miles.

Severe rains did much damage in New England on July 12 and 13. In northern Vermont railroad traffic was interrupted by landslides and many highway bridges were destroyed. On the 14th a locomotive and two cars on the summit of Mt. Washington were blown down the mountain by a high wind and were wrecked. There was no person on the train at the time.

A press dispatch from Atlanta, July 18, reports that all of the passengers in a sleeping car on the Southern Railway were robbed of their valuables and much of their clothing on the trip from Atlanta to Rome Saturday night; and that the robbers, with their booty, left the train at the last named place and went through the same process on the sleeping car of the south-bound train, which was met at Rome. Among those robbed on the south-bound train was the conductor who, on awakening from a short nap, found that his trousers and about \$100 in money had been taken. It is estimated that the aggregate amount of money taken was pretty large, and the passengers, all of whom appear to have been men, had to send out for a good many articles of clothing before they could leave the car.

The coal strike remains unsettled, though negotiations

between prominent operators and the officers of the United Mine Workers have been actively carried on. On Saturday last it was reported that about 4,000 miners quit work along the line of the Norfolk & Western, encouraging the strikers to hope that they could cripple the business in Virginia and West Virginia. E. V. Debs went to West Virginia and tried to stir up the miners there who had not struck. It does not yet appear that his efforts have amounted to anything. The suspension of work at mines in the Pittsburgh district and in Ohio has greatly stimulated business at other mines and on railroads which ordinarily carry only moderate quantities of coal. Pittsburgh operators have filled some large orders with coal bought in the Clearfield and Cambria districts.

The Fast Canadian Trans-Atlantic Line.

There is considerable difference of opinion as to whether the new Canadian fast line of steamers can be made to pay. The steamers will have to depend chiefly on passenger traffic, and comparatively few passengers cross the Atlantic by the St. Lawrence route even in summer, while in winter the bulk of the travel from Canada goes by way of New York. Sir Sanford Fleming takes the ground that 20-knot navigation is impracticable, or at any rate, will be extremely dangerous, in the St. Lawrence during the summer season. There is a long stretch of river navigation from Montreal to Quebec, 170 miles, in part through channels which have to be dredged, and another stretch of nearly 200 miles, past numerous islands that form irregular currents, from Quebec to the mouth of the St. Lawrence; while from the mouth at Remouski or Tadoussac to the Straits of Belle Isle navigation is frequently delayed by fog and ice from Labrador and Hudson's Strait.

British Iron and Steel.

The course of the iron and steel trade during the first half of 1897 has been remarkable in several respects. Notwithstanding that the volume of business was exceptionally large, and stocks of iron were reduced very considerably, prices have, nevertheless, fallen, and great disappointment has been experienced by all connected with the trade. The only possible explanation is the serious depression in the iron trade of the United States, the shadow of which seems to have affected our own industries, and has resulted in further serious competition in various markets. The fact that American iron, both raw and manufactured, has been imported pretty largely into this country could not fail to have a very serious influence, and the determination with which American manufacturers have set to work to secure a larger share of our foreign business is a matter which will likely be more felt as time goes on. It is affirmed on the very best authority that the cost of making pig iron and steel billets is less in America than in this country. The imports of Southern pig iron into England during the last 12 months would probably be about 60,000 to 70,000 tons. It is just reported that the American mills have taken orders for rails for Indian railways, the difference in price being about 2s. under English manufactures, as also an order for water pipes to go to Coolgardie, and steel hoops are being offered at considerably less than English prices laid down both in English and foreign ports. This is in addition to the large quantities of pig iron and steel billets which have already been imported into this country. No doubt this pressure to sell is largely due to the exceptional depression experienced in America, and many are hopeful that much of this competition will disappear if, as seems likely, some improvement will sooner or later be experienced on the other side of the Atlantic. We are not so certain of this, and believe that a considerable portion of the present competition will continue, especially so far as regards the supply of pig iron during the cotton season from the Southern states. During the half-year the price of Scotch pig-iron warrants fell from 48s. 9d. to 48s. 2d., and on June 30 the price was 45s. 6d. No. 3 Middlesbore receded from 40s. 9d. to 38s., and Cumberland hematite from 51s. to 46s. 3d., rallying to 40s. 8d. and 48s. 6d. by the end of the half year. The expansion of the iron and steel trade during the last few years will be manifest from the following figures of production and exports:

	1896.	1895.	1894.	1893.	1892.
Production.....	8,608,444	7,895,675	7,364,745	6,829,841	6,616,890
Exports.....	3,552,286	2,825,511	2,649,998	2,857,743	2,739,279

It now remains to be seen whether, in view of the more serious competition of America, added to that of the Continent, we shall be able to continue the expansion which has taken place during the last three or four years.—*The Economist*.

The Audit Company.

The announcement is made of the establishment in New York of a company, the purpose of which is to examine and report upon the accounts and financial condition of corporations, co-partnerships and individuals, also the physical condition of railroads, manufacturing and other properties. Among the active officers of this company are some well-known names. Mr. William Barclay Parsons and Mr. Henry B. Seaman are connected with the company as engineers. Mr. Thomas L. Greene is Manager and Mr. Stephen Little, Chief Consulting Auditor. The Acting President is Mr. August Belmont, and among the directors and Advisory Committee are the names of many men eminent in financial and business circles. The scheme is very attractive, and, indeed, we have been intending for the last dozen years to organize such a company. Now that somebody else has had the energy to take the first steps we wish for them the success that such an enterprise deserves.

Exports of Domestic Products.

The exports of breadstuffs from the United States in the 12 months ending June 30 amounted to \$189,839,000, which is a great deal more than in any 12 months for the last four years. The nearest approach is in the 12 months ending June 30, 1894, when the breadstuff exports amounted to less than \$162,000,000. The exports of cotton in the last 12 months amounted to \$230,747,000; June 30, 1894, they amounted to \$210,821,000. In neither one of the intervening fiscal years were they as great. The exports of mineral oils in the 12 months ending June 30, 1897, amounted to \$61,734,000. This was a little more than the preceding year and \$21,000,000 more than June 30, 1894. The exports of cattle and hogs amounted to \$34,015,000, which, again, was a much greater value than in either of the three years preceding. The exports of provisions, however, fell off. This value was \$128,156,000 in the last fiscal year. This is about \$1,000,000 more than in 1896, \$2,000,000 less than in 1895 and \$14,000,000 less than in 1894. The total of these items amounted at the end of last June to \$644,491,000, being \$96,000,000 more than in the preceding year, \$124,000,000 more than in 1895 and \$57,000,000 more than in 1894.

Chinese Railroads.

Consul Read writes from Tientsin, April 18, 1897: A few days ago the Imperial Railway opened for traffic another 40 miles of railroad beyond Shan-hai-Kwan, along the Liaotung Gulf, in the direction of Kin Chou. The terminus of these 40 miles just opened is at Chung-hou-so, on the Lu Chou Ho. The total length of the railroad from Tientsin to Chung-hou-so is nearly 214 miles. [This is the extension of the old Kaiping line north-easterly.—EDITOR.]

The line from Tientsin to Peking is within a few miles of Peking and will be opened to the public shortly. The Tientsin-Peking extension will add another 80 miles to the present 214 miles in operation. Mr. Kinder informed me that the survey of the Peking-Paoing-fu extension had been completed, and that the throwing up of embankments would soon be begun. This Peking-Paoing-fu extension will add another 80 miles to the system.

Railroads and Red Petticoats.

And still another train has been stopped by the display of a red petticoat, and twosome or more passengers saved from a frightful death in a chasm of roaring water, the bridge having been washed away by a cloudburst in the dead of night. It is fortunate that the maidens who live near these treacherous spans always wear red petticoats. There are very few localities where red petticoats are in vogue, but the statistics of trains saved show that it is the invariable custom to wear them in the vicinity of bridges that cross mountain streams.—*Boston Herald*.

Hot Weather and Rails.

The effect of the last hot spell on railroad tracks continues to be very severely felt—by the reporters. For instance, some one has been to the expense of telegraphing from Fabyan, N. H., that "owing to the heat on Mt. Washington the railroad tracks expanded to such an extent as to suspend travel to the summit." On inquiry we learn that the tracks have not been affected by the heat, or anything else; that trains have not been suspended or even delayed; that from the time of opening for the summer service they have run regularly, without interruption, and continue to do so. This, however, is quite immaterial to the modern "journalist."

Railroad Commissioners' Conference.

The Railroad Commissioners of New York and of the New England states are to have a conference, to consider subjects of mutual interest, at Portland, Me., on Tuesday, July 27. The idea of a conference originated with Hon. Benj. P. Chabourne, of the Maine Commission, and it met with a general response. The meeting will not interfere with the annual National Convention and it will be a "conference," not a convention. On Wednesday or Thursday the Commissioner's will go to Bar Harbor and on Friday they will go over the Mountain Division of the Maine Central to Fabyan, N. H.

Traffic on the Great Lakes.

Five years ago there was not a vessel on the lakes that displaced 5,000 tons when floating on the St. Mary's River. To-day there are not fewer than 20 high-powered steel screw steamers which displace about 8,500 tons on the same draft of water. This represents an average increase in the carrying capacity of no less than 70 per cent., and the percentage increase in register tonnage is still higher. Steel cargo steamers, 415 ft. in length and 48 ft. in breadth, are now being constructed. These dimensions are greater than those of the average modern ocean steamer, though several British cargo steamers are about 100 ft. longer and their depth and draft of water is much greater. The carrying capacity of this new lake fleet will equal 3,500,000 tons of ore, transported from the head of Lake Superior to Lake Erie in one season of navigation. It is well known that the number of vessel passages through the St. Mary's Canal is much larger than the number of vessel passages through the Suez Canal per annum, the number of such passages being as follows: Suez Canal, 3,494 steamers; Soo Canal, 17,956. The tonnage of the former is 8,448,246 and of the latter 16,806,781 tons. Thus, it is seen that the tonnage passing the Soo Canal during only seven months of a year is 90 per cent. greater than the tonnage passing the Egyptian canal in 12 months.—*Cassier's Magazine*.

Average Holdings of Massachusetts Railroad Stocks.

The *Boston News Bureau* has compiled tables showing the number of stockholders in each of the principal Massachusetts railroads, with the average holdings of each, from which it appears that on all of the roads except the Old Colony the average number of stockholders has during the past four years steadily increased, with a consequent reduction in the average number of shares held by each person. And the decrease in the number of holders in the case of the Old Colony is due to the exchange of a large number of shares for stock of the New Haven road, the exchange stock being held in the New Haven treasury. In the second table these shares are deducted. The tables follow:

Numbers of Stockholders for Four Years.

	1896.	1895.	1894.	1893.
Boston & Albany.....	8,647	8,580	8,465	8,220
Boston & Lowell.....	2,081	2,047	2,005	1,923
Boston & Maine preferred.....	571	544	501	485
Boston & Maine common.....	5,721	5,751	5,815	5,465
Boston & Providence.....	1,655	1,622	1,594	1,594
Fitchburg preferred.....	5,592	5,477	5,504	5,198
Fitchburg common.....	177	158	162	150
N. Y., New Haven & Hartford.....	7,645	6,750	6,654	5,319
Old Colony.....	5,412	5,173	5,113	6,042
Vermont & Massachusetts.....	1,278	1,258	1,255	1,250

Average Holdings of Each Stockholder, in Shares, for Four Years.

	1896.	1895.	1894.	1893.
Boston & Albany.....	29	29	30	30
Boston & Lowell.....	31	31	32	32
Boston & Maine preferred.....	35	38	63	65
Boston & Maine common.....	33	33	32	34
Boston & Providence.....	24	25	25	25
Fitchburg preferred.....	31	32	31	33
N. Y., New Haven & Hartford.....	62	56	57	62
Old Colony.....	19	18	17	23
Vermont & Massachusetts.....	25	25	25	26

A Railroad Concession in Bolivia.

The Consul General of Belgium, at Santiago, Chile, reports that the Bolivian government has granted a concession for a railroad to run from the port on the Pacific, in Chile, which was acquired by Bolivia under a recent treaty, in a general easterly direction through Orouro, Bolivia, to Cochabamba. The charter provides that work on the road must be begun within three months after the approval of the plans, which must be presented within six months after the date of the contract. It is further stipulated that 75 km. (47.2 miles) must be built and opened to traffic annually. The Bolivian government guarantees six per cent. interest on the capital stock.

Lake Notes.

It is stated that the Minnesota Iron Co., operating in Minnesota, north of Duluth, has sold its product for the whole of this year, amounting to about 3,000,000 tons of ore. It is shipping 8,000 tons a day from its Tower hard ore mines and 14,000 from the Mesaba Range and the Chandler mine.

The Duluth, Missabe & Northern, operating in the Mesaba Range, has been delayed by floods, its receipts of about \$18,000 daily being cut off for a week. There have been 20 or more large lake carriers waiting at Duluth for loads.

Iron ore shipments from Lake Superior last month were 1,676,000 tons, and for this year to date about 3,000,000 tons. The entire Lake country has shipped nearly 4,000,000 tons this year so far.

There are no new vessels under way at lake shipyards, but the low freight rates do not seem to have stopped future business, as several contracts are pending. The chief of these is one for a large steel ship to be built at Buffalo. Several tow barges are being figured on by builders, to be added to the fleet of one of the great carrying companies next year. The largest ocean tugboat in the world is under contract at the yard of the F. W. Wheeler Company, at Bay City. A tug for the ocean, second only to this, is now under way at the same yard. The lengths of the two are respectively 145 and 156 ft. with corresponding beam and great power. They will be for use in the Gulf of Mexico, and will be fitted to cross the Atlantic.

A new style of diving bell is being used for getting the cargo of the wrecked Pewabic, which has been in the bottom of Lake Michigan for 30 years, so deep that ordinary bells have burst before getting to the bottom. The new bell is a cylindrical steel tube 6 ft. in diameter and 8 ft. high, of inch steel and arched on top. It is fitted with windows that have been tested to stand the water pressure at a depth of 400 ft., and should they break an automatic contrivance will instantly close. There is an arc light outside the bell of 2,500 candle power, and the bell is fitted with air pipes and a telephone connection.

Central American Trade.

Within the past two months more railroad equipment track material and supplies have been shipped to Central America than for some years previous. Not long ago one firm alone shipped to Salvador upward of \$60,000 in railroad material and repair shop tools, and it is said that by every steamer more or less track tools are still being sent. Three of the principal firms buying this class of merchandise for Salvador are J. Aparicio & Co., Jacobo Baiz and De Sala, Lobo & Co. Honduras has also been receiving considerable equipment and track material from here, and though the shipments are not large they are steady. To Honduras the leading shippers of such goods are K. Mandel & Co., Eggers & Heinlein and Valentine Bros.—*Journal of Commerce* (New York).

C. L. Pullman Car Company, Incorporated.

The C. L. Pullman Car Co. has been incorporated at Chicago to make and sell street cars. The capital stock is \$5,000,000. The incorporators are C. L. Pullman, E. C. Pullman, G. E. Highley, H. J. Furber and G. S. Steere.

Sunday Steamboats in Massachusetts.

The Massachusetts Railroad Commissioners are still struggling with the Sunday transportation problem. One day last week they had a conference with the officials of the New York, New Haven & Hartford Railroad, to find just what their schedule of Sunday trains, as shown by the employees' time card, meant. They are to settle in the near future the number of trains the Boston & Maine road may run on Sunday. They have issued an order refusing the petition of the Peoples' Steamboat Company, of Fall River, for the privilege of running boats from that city to Crescent Park, R. I. It is understood that the boats of this line are let from day to day, and that it cannot be called a regular daily service like that of the Providence, Fall River and Newport line, which was granted the right to run a boat each way on Sunday. There is but one Sunday excursion boat running from Boston at the present time, all the rest of the boats running Sunday being on regular daily lines, to Nantasket, Gloucester, and other points. The Lewiston, run by the Bay State Company, runs to the Isles of Shoals or down the harbor, every day, so that the question which would be raised should she ask the license to run Sunday would be different from that raised in Fall River.

Hospital Service on the Chesapeake & Ohio.

The officers of the Chesapeake & Ohio Railroad are organizing a hospital service. They intend to use the hotel on the hill at Clifton Forge for a railroad hospital. To this the sick and injured employees of the railroad will be brought for care. It is expected that as the plan develops, subordinate local hospitals will be organized at various points. The intention is to have all officers and employees of the company pay regular monthly assessments for the maintenance of this service; but these assessments will be small and there will be at least three rates, depending upon the amount of monthly wages or salary. The lowest rate will be 15 cents a month, which we believe is lower than has ever before been tried on any railroad.

This company has encouraged the establishment, at various points on its lines, of Railroad Young Men's Christian Associations, and has contributed very liberally to the expense of erecting buildings. Accounts of this have appeared in the *Railroad Gazette* from time to time. The officers have long been convinced of the great value of these institutions. There is no doubt that they have improved the morals and the physical condition of the men, and it is probable that they have had a good effect on discipline. They help to keep the men out of the saloons; they provide for them places for sensible amusement and occupation during their hours off, and baths, beds and good food.

New English Sleeping Cars.

The London & Northwestern has lately built a number of new sleeping cars, to run on the West Coast route to Scotland, which are 70 ft. long and have 6-wheel trucks. These cars were built at Wolverhampton from designs by Mr. A. C. Park. They have end platforms which are "completely enclosed so as to prevent the draughtiness of side doors," which, being interpreted in American language, means, apparently, vestibules. The cars have corridors the whole length on one side and there are 11 "cabins" or compartments, six containing double berths and five single. Only two of these cabins have upper berths. In all the cabins except one the beds are placed so that the occupant lies crosswise of the car. The smoking compartment is in the middle of the car, and there are lavatories at each end arranged apparently in the American fashion. The interior woodwork finish of the cabins is in great variety, satin wood, maple, Italian walnut and other rare kinds being used. The occupant of a cabin can light or extinguish his gaslight at any time by means of a hinged globe.

The Divided Axle in Germany.

Glaser's *Annalen* recently contained a communication on the ancient subject of a divided axle, dealing with several devices that have been put in service. In one arrangement mentioned, the axle is simply cut through and then held together by a muff or yoke. Another has a binding ring provided with side-flanges, which are put together with a good joint with asbestos washers, thus preventing the entrance of dust and the escape of oil. The German engineers appear to have concluded that it is necessary to assist the operation of such arrangements by providing ample lubrication.

French and Welsh Coal.

The *Journal des Transports* calls attention to the order that was issued at the time of the great naval review at Spithead (or, as the French call it, Spitead) requiring the vessels taking part to use Welsh coal. It is said that any vessel declining to conform to this order was required to leave the line and the vicinity. Some witty persons have suggested that the English wished to reimburse themselves for the jubilee expense by compelling foreign vessels to buy Welsh coal. This, however, the *Journal* does not believe, the truth being that the Welsh coal emits very much less smoke than French coal, and at the same time the calorific value is from 10 to 15 per cent. more than that of the French coal. While these admissions are painful to the French miners they are, nevertheless, true and the *Journal* thinks may be made without any lack of patriotism.

LOCOMOTIVE BUILDING.

The Schenectady Locomotive Works is building three 12-wheel compound locomotives for the Butte, Anaconda & Pacific Railroad. The cylinders of these locomotives are 23 and 34 in. in diameter and 32-in. stroke. The driving wheels are 56 in. in diameter; weight of engine in working order, about 189,000 lbs. The boilers are of the extended wagon top, radial stayed type, with about 3,000 sq. ft. of heating surface and are designed to carry 200 lbs. working pressure. The driving-wheel centers are of cast steel.

The Illinois Central has placed an order with the Rogers Locomotive Co. for 5 and with the Brooks Locomotive Works for 10 standard 19 in. x 26 in. mogul locomotives. These engines are in stock, and will probably be delivered within two weeks. The railroad company has also given an order to the Rogers Locomotive Co., for four 10-wheel locomotives similar to those described in the *Railroad Gazette* of July 2 last, and another order for one 8-wheel passenger locomotive to the Brooks Locomotive Works; this last type was described in the *Railroad Gazette* of Feb. 5 last.

CAR BUILDING.

The Northern Pacific is in the market for 100 flat cars. The Chicago & Eastern Illinois is in the market for 30 flat car bodies.

The Chicago, Milwaukee & St. Paul will shortly build 150 furniture cars, 50 ft. long, at its own shops.

The Barney & Smith Car Co. has received an order from the Washington Coal & Coke Co. for 100 coal cars.

It is reported that the International & Great Northern has placed an order with the Mt. Vernon Car Mfg. Co., for 150 box cars.

The Missouri Car & Foundry Company has received an order for 100 cars from the Interoceanic Railway of Mexico.

The Northern Pacific has ordered from the Haskell & Barker Car Co., of Michican City, Ind., 300 box cars of 60,000 lbs. capacity.

It is reported that the Shippers' Refrigerating Car Co. has placed an order with the Missouri Car & Foundry Co. for 25 refrigerator cars.

It is reported that the Brooklyn Heights Railroad Co. has placed orders for 60 new closed cars. The St. Louis Car Co. and the Laclede Co., both of St. Louis, Mo., and the Brill Car Co., of Philadelphia, will build 20 each.

The Minneapolis, St. Paul & Sault Ste. Marie has given an order to the Wells & French Co. for 500 box cars of 60,000 lbs. capacity, the railroad company's standard. These cars will be equipped with Westinghouse air-brakes and Washburn vertical plane couplers. They are to be delivered in August and September.

BRIDGE BUILDING.

Birmingham, Pa.—Viewers have been appointed to locate a bridge over the Juniata River at this point, in place of that recently destroyed by the storm. The bridge is to be built by the state.

Cleveland, O.—Bids are asked, Aug. 12, for the steel and iron work of a 60-ft. span plate girder approach to the bridge to be built over the railroad on Wilson avenue. George R. Warden, Director of Public Works.

Jefferson City, Mo.—Bids will be readvertised for, Aug. 6, for a 250 ft. span steel bridge with 60-ft. girder approaches. F. W. Roer, County Clerk.

Johnstown, Pa.—The Commissioners of Cambria County have awarded the contract for the new bridge across the Conemaugh River in Munster Township to the King Bridge Co. at \$1,137. Other bids were as follows: Horseheads Bridge Co., \$1,230; Penn Bridge Co., \$1,233; Wrought Iron Bridge Co., \$1,220; West Virginia Bridge Co., \$1,178; Pittsburgh Bridge Co., \$1,152; Toledo Bridge Co., \$1,152; Havana Bridge Works, \$1,150; Groten Bridge Mfg. Co., \$1,140.

Liberty, Ind.—Bids are asked, July 31, for a county bridge over Indian Creek.

New York.—Reports state that Chief Engineer Bird-sall, of the Department of Public Works, has announced that bids for the proposed Willis avenue bridge, across the Harlem River, will be advertised for in a few days.

Niagara Falls, N. Y.—The formal opening of the new steel arch railroad bridge will take place on July 29. This bridge has a span of 550 ft., and replaces the lower suspension bridge at this point. Mr. L. L. Buck is Chief Engineer, and the Pennsylvania Steel Co. is the contractor.

Portland, Me.—The Railroad Commissioners have rendered a decision in the matter of the Washington street bridge at this place. A bridge is to be built at once, at a cost of \$20,000. The city is to pay half of the cost, and the Portland Railroad and the Portland & Rochester one-quarter each.

Reading, Pa.—The County Commissioners are asking for bids, July 30, for the steel work for a bridge near Shultzville and also for one at Lobachville. Bids on the masonry for the same are asked, July 29. Geo. K. Linderman, Chairman.

Richford, Vt.—The heavy rains last week carried away several highway and railroad bridges in this vicinity. At Abrecon, seven miles from Richford, three bridges are gone.

Snow Camp, N. C.—The Dixon Woolen Mfg. Co., of this place, will build an iron bridge across Crane River, near the mill site.

Syracuse, N. Y.—The contract for the steel girder bridge over Onondaga Creek, at Seymour street, has been given to the Wrought Iron Bridge Co., at \$4,832; and the contract for a steel girder bridge over the same stream, at Temple street, to the same company, at \$4,654.

Windsor, Vt.—The Boston & Maine has plans nearly completed for a stone bridge to replace that across the Connecticut River, one arch of which was carried away by a log jam some time since.

Yorkville, S. C.—The County Commissioners have ordered an election to be held next month to vote on a proposition to build an iron and steel bridge across the river to cost about \$10,000.

RAILROAD LAW—NOTES OF DECISIONS.**Carriage of Goods and Injuries to Property.**

In North Carolina two railroad corporations entered into a traffic arrangement, and associated themselves as a "fast freight line." Plaintiff contracted with the general agent of such associated line for the shipment of freight over the line. The Supreme Court rules that the companies were jointly liable under the contract for damages resulting from delay in the transportation of the freight irrespective of the portion of the line on which such delay occurred.¹

In California the Supreme Court holds that under the provision of the code, declaring that the liability of a carrier who accepts freight for a place beyond his route ceases on delivery to a connecting line, "unless he stipulates otherwise," a provision in a freight contract that the carrier's responsibility shall cease at the connecting point is not rendered ineffective by a further stipulation for through passenger train service.²

In Texas it appeared that plaintiff's horses were unloaded at one of the defendant's yards en route, that they escaped from the pen in which defendant had placed them, and were damaged while at large. The Court decides that defendant was an insurer against damage from such a cause.³

In the same state it is ruled that to exonerate a railroad from liability for fires set by its engine, it must be shown, not only that the engine was furnished with the best appliances, and that these were in good condition, but also that it was skillfully handled.⁴

In Idaho it is held that a railroad, if without fault, is not liable for killing horses turned loose, without its knowledge or consent, upon its right of way, to graze and obtain water, and then abandoned.⁵

In Oklahoma it is held that a railroad is not liable for the killing of stock which strays upon the track because of the want of a fence, unless it appears that plaintiff is an abutting owner, who has constructed a fence on all sides of his land except that abutting on the right of way, and given notice thereof to the company, and that the company has neglected to fence the remaining side.⁶

In Alabama the Supreme Court rules that one who has bought property agreeing to pay therefor when sales are made by the consignees, to whom he has it shipped, who are to pay the freight at the point of destination, remitting to him the proceeds less the freight, is the general owner, and entitled to sue the carrier for failure to deliver.⁷

In Texas, while a consignment of cotton was on a compress company's platform, a railroad company executed to the owner a bill of lading therefor, and bound itself to transport it. The bill provided that the company and connecting carriers should not be liable for loss of or damage to the cotton "while in transit, or while in depot or place of transshipment, or of landing at place of delivery." While yet on the compress company's platform the cotton was burned. The Supreme Court holds that the cotton was not constructively in transit.⁸

In Texas a complaint alleged breach of contract by defendant carrier to receive and ship cattle promptly on the 17th day of the month. The answer alleged that the delay was caused by plaintiff's fault in not having the cattle inspected, as required by law, before they could be shipped. The replication alleged that they were ready to be inspected late on the evening of the 17th, but that defendant's agent informed plaintiff that they could not be shipped out that night, and that, therefore, inspection was delayed till the next morning. The Court of Appeals rules that, plaintiff's failure to have the cattle inspected being a sufficient excuse for defendant's failure to receive and ship them on the 17th, unless plaintiff was induced to forego the inspection by the agent's information, and the only issue, except the amount of damages, being whether he was so induced, it was error to submit the case to the jury with instruction which, in effect, deprived defendant of its defense of non-inspection.⁹

In Texas it is held that a carrier receiving cattle for shipment, and putting them into pens till they are shipped, is liable for injury resulting to them from defects in the pens due to its negligence.¹⁰

Injuries to Passengers, Employees and Strangers.

In Indiana it is decided that a street railway is not liable to a passenger injured by a fall when alighting, it being caused by the pushing and jostling of passengers, and by a passenger stepping on her dress, and the conductor being at the time on the ground, lifting said passenger's child from the car.¹¹

In the same state it is decided that a passenger (a minor 15 years old, and of average intelligence) is, as a matter of law, guilty of contributory negligence in going upon the lowest step of the car to vomit, while the train is in rapid motion, though there was only standing room in the car.¹²

In Massachusetts a boy seven years old jumped on the rear end of a street car, and rode on the step as a trespasser. The conductor saw him, but said nothing to him; and while the car was in motion he jumped off, and was killed by falling on the pavement. The Supreme Court holds, in an action for his death, that a verdict was properly directed for defendant.¹³

In North Carolina it is ruled that a person who enters a railroad train which does not stop at the station to which he purchased a ticket, and who refuses to pay fare to any other station, is not entitled to recover punitive damages for being ejected, where it is done without insolence, and no unnecessary force is used.¹⁴

In Colorado, mere evidence that deceased, a track repairer, while walking outside the track in the perform-

ance of his duties, was fatally injured by a large lump of coal which fell from a passing train, is insufficient to show negligence on the part of the company.¹²

In Tennessee, a servant injured by falling from a trestle while walking on a plank which is so worn as not to be more than three inches wide at the top, cannot recover, though he had notified the master of the defect and was given a promise, indefinite as to time, that the plank would be replaced by a new one.¹³

- ¹ Rocky Mount Mills v. W. & W. 25 S. E. Rep., 851.
- ² Colfax v. S. P., 46 Pac. Rep., 668.
- ³ T. & P. v. Turner, 37 S. W. Rep., 643.
- ⁴ G. H. & H. v. Burnett, 37 S. W. Rep., 779.
- ⁵ McDonald v. G. N., 46 Pac. Rep., 766.
- ⁶ McCook v. Bryan, 46 Pac. Rep., 506.
- ⁷ L. & N. v. Allgood, 20 S. W. Rep., 986.
- ⁸ Amory v. G. & C. S. F., 37 S. W. Rep., 856.
- ⁹ G. H. & S. A. v. Rutledge, 37 S. W. Rep., 176.
- ¹⁰ G. H. & S. A. v. Jackson, 37 S. W. Rep., 255.
- ¹¹ Furgason v. Citizens' S. R., 44 N. E. Rep., 936.
- ¹² C. C. & St. L. v. Moneyhun, 44 N. E. Rep., 1106.
- ¹³ Bristman v. U. S. R., 44 N. E. Rep., 1091.
- ¹⁴ Allen v. W. & W., 25 S. E. Rep., 787.
- ¹⁵ Anderson v. U. P., D. & G., 46 Pac. Rep., 840.
- ¹⁶ Brewer v. Tenn. C. I. & R., 37 S. W. Rep., 549.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Great Northern, quarterly, preferred, $1\frac{1}{2}$ per cent., payable Aug. 2.

Huntington & Broad Top Mountain Railroad & Coal Co., semi-annual, preferred, $2\frac{1}{2}$ per cent., payable Aug. 2.

Michigan Central, 2 per cent., payable Aug. 2.

Nashville, Chattanooga & St. Louis, 1 per cent., payable Aug. 2.

Albany, quarterly, $1\frac{1}{2}$ per cent., and extra, 1 per cent., both payable Aug. 2.

Columbus (O.) Street, quarterly, 1 per cent., payable Aug. 21.

Worcester (Mass.) Traction, preferred, 3 per cent., payable Aug. 1.

Stockholders' Meetings

Meetings of the stockholders of railroad companies will be as follows:

Illinois Central, to vote on bond issue, Chicago, Sept. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Railroad Superintendents* will hold its next meeting at Nashville, Tenn., beginning Sept. 22.

The *American Street Railway Association* will hold its sixteenth annual convention in Convention Hall, Niagara Falls, Oct. 19-22, 1897.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *Railway Signaling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1333 Marquette Building Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

Road Masters' Association of America.

The annual meeting of the Road Masters' Association of America will be held at Old Point Comfort, Va., on Sept. 14 to 16 inclusive. The Road and Track Supply Association will also meet there at the same time. The headquarters for both associations will be at the Chamberlin Hotel, where space for exhibits has been offered.

Western Foundrymen's Association.

The latest meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Wednesday evening, July 21. Mr. H. F. Frohman presented a paper entitled "Foundry Facings." The final report of the Legal Committee on "Apprenticeship" was also presented. The question of holding an out-of-town meeting in the fall came up for discussion.

National Railroad Master Blacksmiths' Association.

The National Railroad Master Blacksmiths' Association will hold its fifth annual convention at the Leland Hotel, in Chicago, commencing on Sept. 7, 1897. The convention will be devoted to the reading of papers and discussion of topics within the province of the master blacksmith. It is requested that members come with papers prepared to take part in the discussions. The Leland Hotel has made a special rate of \$2 a day to members.

The Chicago Belt Railway Club.

The Belt Railway Club was organized by the employees of the Chicago & Western Indiana Railroad and the Belt Railway Co., Chicago, July 15. The Railroad Company has fitted up a building which is 20 ft. x 40 ft., and was formerly used for a station. In this building, which is opposite the shops at Eighty-third street, there will be reading and meeting rooms, and two meetings will be held each month at which topics of interest will be discussed. The club started with 35 members and it is expected the membership will increase to 150 within the next two months.

The International Congress of Naval Architects and Marine Engineers.

The annual summer meeting of the Institution of Naval Architects (British) this year took the form of an International Congress of Naval Architects and Marine Engineers held in London. The sessions began Monday evening, July 5, and lasted through the week. The formal opening took place under the presidency of the Prince of Wales, and the meetings were attended by many distinguished people. The President is the Earl of Hopetoun, and his address was a review of the growth of the merchant marine and the navy during the reign of Queen Victoria. The section of construction and naval architecture sat under the presidency of Lord Hopetoun, while the section of marine engineering was presided over by Sir Edward Reed. Many important papers were presented, and the sessions were attended by members and guests from the United States and the Continent, as well as from Great Britain.

The American Institute of Electrical Engineers.

The fourteenth annual meeting of the Institute will be held at Greenacre-on-the-Piscataqua, Eliot, Me., July 26 to 28, inclusive, the opening session to be held at 2 p. m. on Monday, July 26. The following papers will be presented: "The Precision of Electrical Engineering," inaugural address by the President, Dr. Francis B. Crocker, of New York; "Electrical Traction; Notes on the Application of Electrical Motive Power to Railway Service, with illustrations from the practice of the Metropolitan Elevated Railroad, Chicago," by M. H. Geary, Chicago; "The Cost of Steam Power," by Horatio A. Foster, Buffalo, N. Y.; "Recent Applications of Storage Batteries to Electric Railways," by Herbert Lloyd, Philadelphia; "The Effect of Armature Inductance on the Electric Motive Power of an Alternator," by Prof. W. E. Goldsborough, Lafayette, Ind.; "Effect of Heat upon Insulating Materials," by P. A. Bates and W. C. Barnes, New York; "A New Form of Induction Coil," by Prof. Elihu Thomson, Lynn, Mass.; "Electric Metering from the Station Standpoint," by C. D. Haskins, Boston, Mass.; "Efficiency and Life of Carbons in Enclosed Arc Lamps," by W. H. Freedman, New York; "Armature Reactions in a Rotary Transformer," by Prof. R. B. Owens, Lincoln, Neb.; "The Economy and Utility of Electric Cooking Apparatus," by Prof. J. P. Jackson, State College, Pa.; "Development of the Fire Alarm Telegraph," by Adam Bosch, Newark, N. J.

Greenacre is a quiet summer resort in Eliot, Me., four miles from Portsmouth, N. H., founded by the daughter of the late Moses G. Farmer. There will be a reception Tuesday evening, July 27, and on the following day there will be an excursion to the Isle of Shoals.

The British Association for the Advancement of Science.

Very elaborate preparations are under way for the entertainment of the British Association for the Advancement of Science, at Toronto, Aug. 18-25. It is said that \$25,000 have been appropriated by the several governments, dominion, provincial and city. The retiring President is Lord Lister (Sir Joseph Lister), the discoverer of the method of antiseptic bandaging to which his name has been applied. He was born in 1827, and has been Professor of Surgery at the College of London since 1877. The President-elect, Sir John Evans, born in 1823, is prominent as an antiquarian and numismatist, and has been High Sheriff of Hertfordshire, and held other public offices. The President of the local committee is Prof. A. B. Macallum. Among the Vice-Presidents for this meeting are the Earl of Aberdeen, Governor-General of Canada; Lord Rayleigh, who was President of the Association when the meeting was held at Montreal in 1884, the only previous occasion when a meeting was held outside the British Isles; Lord Kelvin (formerly Sir Wm. Thomson); Sir Wilfrid Laurier, Prime Minister of the Dominion of Canada. Garden parties are arranged for Thursday, Friday, Monday, Tuesday and Wednesday afternoons. A reception will be given by the Governor-General and the Countess of Aberdeen. A banquet will be given on Wednesday evening, Aug. 25, in honor of Lord Kelvin, Lord Lister and Sir John Evans. Several excursions are arranged for Saturday, and a very elaborate scheme of long excursions at the close of the meeting, over the entire line and branches of the Canadian Pacific Railroad west of Toronto, on the one hand, and trips to Montreal on the other. The Canadian railroads all give half fares to members of the Association during July, August and September. Members of the American Association for the Advancement of Science are admitted to membership in the British Association for this meeting.

PERSONAL.

—Mr. George E. Starr, Assistant to the President of the Choctaw, Oklahoma & Gulf, has resigned.

—Mr. R. B. Finch has been appointed General Agent of the Duluth, South Shore & Atlantic, with headquarters at West Superior, Wis.

—Mr. G. B. Ramsey has resigned as Traveling Freight and Passenger Agent of the Mobile & Ohio, at Jackson, Tenn., and that office has been abolished.

—The jurisdiction of Mr. H. K. Gregory, Assistant

General Passenger Agent of the Southern California, has been extended over the Santa Fe Pacific.

—Mr. George W. Turner, who was at one time Superintendent of Motive Power of the St. Paul & Pacific, died at St. Paul, Minn., July 7, at the age of 66.

—Mr. John L. Woodruff, Assistant Division Superintendent of the New York, New Haven & Hartford, at Westfield, Mass., died at his home in that town on July 7.

—Mr. William E. Guerin has resigned as President and General Counsel of the Columbus, Sandusky & Hocking, which recently passed into a Receiver's hands.

—Mr. F. A. Jones has been appointed General Agent of the Passenger Department of the Santa Fe Pacific and the Southern California, with headquarters in Santa Barbara, Cal.

—Mr. Henry Martin, who was at one time President of the Attica & Buffalo and the Cleveland & Toledo railroads, died at his home in Buffalo, N. Y., July 7, aged 94 years.

—Mr. William P. Shearman, who was at one time Treasurer of the Erie Railroad, died at his home in Allendale, Bergen County, N. J., July 20, from paralysis. Mr. Shearman was 65 years old.

—Mr. G. A. Deane, Jr., has been appointed Traveling Passenger and Land Agent of the St. Louis, Iron Mountain & Southern, with headquarters in Chicago, to succeed Mr. T. C. Kimber, transferred.

—Mr. Clarence S. Anthony, Auditor of the Fitchburg Railroad, with headquarters in Boston, Mass., died suddenly at his home in Waltham, Mass., July 15, of apoplexy. Mr. Anthony was 46 years of age.

—Mr. Joseph A. Werne, heretofore Contracting Agent of the Kanawha Dispatch, has been appointed Traveling Freight Agent of the Chesapeake & Ohio, to succeed Mr. W. S. Harrison, resigned to enter other business.

—Mr. H. C. Bush has been appointed General Agent, Freight Department, and Mr. John L. Truslow, General Agent, Passenger Department, of the Santa Fe Pacific and the Southern California, both with headquarters at San Francisco, Cal.

—Mr. T. N. Hooper, Division Freight Agent of the Chicago Great Western, at Des Moines, Ia., has in addition to his other duties been placed in charge of the company's operating forces at Des Moines. His title will remain the same.

—Mr. Edward W. Hempstead, Train Dispatcher of the Erie, at Elmira, N. Y., has resigned to become a division superintendent on the Brooklyn Heights (Electric) Railroad. Mr. Hempstead will be succeeded on the Erie by Mr. Henry A. Williams.

—Mr. J. W. Boat, heretofore Chief Clerk of the accounting department of the Weatherford, Mineral Wells & Northwestern, has been appointed Auditor and Treasurer, with headquarters at Weatherford, Tex., to succeed Mr. E. R. Standish, resigned.

—Mr. A. C. Stonegrave has been appointed General Agent of the Freight and Passenger departments of the Central Vermont in Canada, with headquarters at Montreal. Messrs. F. H. Brown and A. Rushton have been appointed Soliciting Agents under Mr. Stonegrave.

—Mr. George McL. Brown, formerly District Passenger Agent of the Canadian Pacific, with headquarters at Vancouver, B. C., has been appointed Executive Agent for the same road in British Columbia in connection with all matters outside of construction and operation.

—Mr. D. G. Gray has been appointed Chief Clerk in the general freight offices of the Baltimore & Ohio at Pittsburgh, Pa. Mr. Gray was formerly Chief Clerk of the Columbus freight office of the Baltimore & Ohio, in which position he will be succeeded by Mr. Lester Constans.

—Mr. D. B. Lewis has been appointed Northwestern Passenger Agent for the Cincinnati, Hamilton & Dayton, with headquarters at Chicago, to succeed Mr. Perry Griffin, who is now connected with the Passenger Department of the Chicago, Rock Island & Pacific at New York City.

—Mr. A. A. Poland, heretofore Commercial Agent of the Chicago, Peoria & St. Louis, at St. Louis, Mo., has been appointed Southwestern Agent of the Rome, Watertown & Ogdensburg and of the Ontario Dispatch, with headquarters at St. Louis, to succeed Mr. I. B. W. Dutcher, deceased.

—Mr. H. C. Stuart, General Freight and Passenger Agent of the Chicago, Iowa & Dakota, has, in addition, been appointed General Manager of that road, to succeed Mr. William S. Porter, resigned to take charge of the electric light plant at Eldora, Ia. Mr. Stuart's headquarters will be at Eldora.

—Mr. Henry Howland died at his home in Asbury Park, N. J., July 16, of paralysis, aged 82 years. Mr. Howland was actively interested in the building of the Long Branch & Seashore Railroad, and was President of that company from its organization until 1869, when it was merged into the New Jersey Southern.

—Mr. C. W. Galligan, heretofore Assistant General Freight Agent of the St. Louis, Chicago & St. Paul, has been appointed General Freight Agent, with headquarters at St. Louis, Mo. Mr. E. A. Williams, Assistant General Passenger Agent of this company, has been made General Passenger Agent, with headquarters in St. Louis.

—Mr. Charles F. Crocker, First Vice-President of the Southern Pacific, whose headquarters were in San Francisco, Cal., died at his country home at Uplands, San Mateo, Cal., July 17. Mr. Crocker was born Dec. 26, 1854, at Sacramento, Cal. He entered railroad service Jan. 2, 1877, as clerk in the office of the Division Superintendent of the Southern Pacific. He was elected Third Vice-President of that company Oct. 23, 1878, holding that office until October, 1888, when he was made Second Vice-President. He was elected to his late office April 9, 1890.

—Mr. Columbus R. Cummings died at his home in Chicago July 12, after an illness of several months. Mr. Cummings was born at Canton, N. Y., in 1834. The first part of his life was devoted to mercantile business, but he afterward took an active part in building the Erie Railroad, and eventually became its President. Mr. Cummings was best known for the part which he took in promoting the New York, Chicago & St. Louis, of which company he was the first President. Mr. Cummings was also for several years President of the Wheeling & Lake Erie.

—Col. George F. Gage, General Manager of the Huntingdon & Broad Top Mountain, has resigned, to

take effect Sept. 1 next, and it is expected that he will be succeeded by his son, Mr. Carl M. Gage. Colonel Gage entered railroad service in 1851 with the Delaware, Lackawanna & Western. He was afterward connected with the Lackawanna & Bloomsburg and the Mine Hill Railroad until 1866, when he was appointed Superintendent of the Reading & Columbia. He was made General Superintendent of the Huntingdon & Broad Top Mountain in 1873 and some years later was appointed to his present office.

ELECTIONS AND APPOINTMENTS.

Columbus, Sandusky & Hocking.—Lawrence Maxwell, Jr., has been appointed General Counsel for the Receiver, with headquarters in Cincinnati, O. He will have charge of all matters pertaining to the legal department. Receiver Felton has discontinued the office of Division Freight Agent at Toledo, and Mr. C. C. Collins has retired.

Gulf & Manitoba.—At the annual meeting of stockholders, held in Des Moines, Ia., July 8, the old Board of Directors was re-elected. Officers were then elected as follows: President, E. E. Carpenter, Beloit, Ia.; Vice-President, J. K. Brown, Jackson, Minn.; Secretary, J. J. Bell, Des Moines; Treasurer, William T. Smith, Des Moines.

Little Kanawha Valley.—At a meeting of stockholders, held at Parkersburg, W. Va., July 12, directors were elected as follows: H. C. Jackson, W. A. McCosh, G. E. Smith, R. Rector, William Beard, W. E. Fleming, J. M. Hamilton, J. S. Withers and W. C. De Camps. At a subsequent meeting of the directors the following officers were elected: President, H. C. Jackson, Vice President, J. S. Withers; Secretary and Treasurer, W. A. McCosh; General Counsel, V. B. Archer; Superintendent, C. L. Williams; Chief Engineer, Thomas Pettigrew.

St. Louis, Chicago & St. Paul.—C. W. Galligan, formerly Assistant General Freight Agent, has been appointed General Freight Agent, and E. A. Williams, formerly Assistant General Passenger Agent, has been appointed General Passenger Agent, both with headquarters at St. Louis, Mo.

Weatherford, Mineral Wells & Northwestern.—J. W. Boat, heretofore Chief Clerk of the accounting department, has been appointed Auditor and Treasurer, with headquarters at Weatherford, Tex., to succeed E. R. Standish, resigned.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Aroostook Northern.—This company was organized July 12 to build and operate the extension of the Bangor & Aroostook, to which reference was made last week. The proposed route is from Caribou, Me., on the Bangor & Aroostook, eastward 15½ miles through Fort Fairfield to Limestone. Surveys are now being made under the direction of R. H. Cushing, Chief Engineer. The road is expected to be in operation by Dec. 1. Albert A. Burleigh, of Houlton, Me., President of the Bangor & Aroostook, is a director in the new company.

Atchison, Topeka & Santa Fe.—Work has been begun to rebuild the track from East Atchison, Mo., east to Rushville, five miles, which was washed out by the Missouri River several years ago. About a mile of the line will be over the Missouri River sandbar, necessitating much trestle work.

Atlantic & Lake Superior.—The work of extending this road from Caplin east and north along the shore of the Baie des Chaleurs about 115 miles to Gaspé is reported to be making rapid progress. The route for 20 miles to Paspébiac has been determined and the contract for grading given to Perrault & Gervais. The western portion of the road, extending some 80 miles from Metapédia to Caplin, is being extensively regraded under the direction of J. M. Shanley, Chief Engineer.

Canyon City & Cripple Creek Gold Belt.—Contracts have been awarded to Orman & Crook, of Pueblo, Col., to build the first section from Cañon City north toward Cripple Creek, Colo.

Chicago & Southeastern.—This road, which extends from Brazil, Ind., 100 miles northeasterly to Anderson, proposes an extension of 18 miles eastward to Muncie. It will follow the route surveyed several years ago. The company was reorganized in 1891 as successor to the Midland Railroad.

Gulf & Manitoba.—D. N. Stanton & Sons, of New York, have been awarded the contract for building this road and the Jackson Southern Railroad. These lines have been under consideration as separate enterprises for about two years, but it is proposed now to consolidate them. The route of the Gulf & Manitoba is in a northerly direction across Iowa from Enos, Taylor County, 250 miles to Dickinson County. Under the name of the Jackson Southern it is proposed to extend the line north 250 miles through Minnesota to Brainerd, Minn., on the Northern Pacific. Plans are also under consideration for a Southern extension from the Iowa state line to connect with the Kansas City, Pittsburgh & Gulf. It appears that the rapidity of construction depends upon the support which the lines shall receive along the route. The names of the new officers of the Gulf & Manitoba will be found in another column.

Hutchinson & Southern.—Preliminary surveys are being made for an extension of about 50 miles from Medford, Okla., where this road connects with the Chicago, Rock Island & Pacific, directly east to Ponca City, on the Atchison, Topeka & Santa Fe.

Kansas City & Westport Belt.—This company has been incorporated with capital stock of \$150,000 to build a line in Jackson County, Mo., from the Kansas City, Osceola & Southern, near the Blue River, northward about 15 miles, through Westport to Kansas City. The incorporators are D. C. and J. A. Blair and Conrad Miller, New York, and B. S. Josselyn, Henry Pleiffer and J. H. Lucas, Kansas City.

Kansas, Oklahoma & Gulf.—A charter was issued for this line at Guthrie, Okla., July 12, with a capital stock of \$1,000,000. The directors are: G. R. Willett, of Blackwell, Okla.; W. P. Wardwick, J. W. Pickett, J. B. Tucker, E. L. Peckham and J. W. Randall. The proposed route is from the St. Louis & San Francisco at Cale, Kan., 40 miles, southwest through Blackwell to some point on the Chicago, Rock Island & Pacific.

Montfort Colonization.—This company is extending its road 12 miles from Montfort, Que., west to Arundel. The line at present operated is 21 miles long, from Montfort east to Montfort Junction, on the Canadian Pacific. It is narrow gauge and has been operated a little more than two years.

Philadelphia, Washington & Baltimore.—The new cut-off between Elktion and Iron Hill, Md., has been put in service. This eliminates a number of sharp curves. The company expects soon to begin straightening the track west of Elktion from Bacon Hill to Charleston.

Pittsburgh, Bessemer & Lake Erie.—That part of this road, running south from Butler, Pa., to the Allegheny River, 30 miles, is now so near completion that President James H. Reed announces Aug. 20 as the date for the formal opening. The first train will be loaded with Missabe ore. The contract for this part of the road was taken by C. I. McDonald & Co., of Pittsburgh, July 8, 1896.

Portland & Rumford Falls.—The Otis Falls Branch, which runs east from Canton, Me., connecting with the Maine Central, near Otis Falls, is now ballasted the whole distance. The first span of the bridge across the Androscoggin is in place, and the second rapidly going up.

Saco River.—The Maine Railroad Commissioners have approved of the articles of incorporation of this line, to run from Saco, on the Boston & Maine, north through Buxton, on the Portland & Rochester, to Bonney Eagle, Me., 20 miles. The capital stock is \$250,000. The incorporators are Charles S. Hamilton and William A. Roberts, Biddeford, Me.; J. O. Bradbury, Saco; Francis A. Hobart, Braintree, Mass., and Oliver Downing and E. B. Loring, Boston.

Southwest Junction.—A contract has been let to Z. T. Henry, of Irwin, Pa., to build 2½ miles of road in Westmoreland County, Pa., from Trangers Station to McCreary Farm. Charles E. Speer, President of the company, is also President of the Connellsville Coke Co., which is about to construct a coke plant of 120 ovens on the McCreary Farm.

Wheeling & Lake Erie.—The contract was let July 12 to Thomas J. Stringer, of Portland, O., for an extension of this road from the upper end of Martin's Ferry, O., opposite Wheeling, W. Va., to run a mile down the Ohio River front to the Martin's Ferry blast furnace. Final surveys are being made to carry the road a mile and a half further to the Etna-Standard plant. The contract is for grading and filling in only, the railroad furnishing all the timber and other supplies.

White & Black River Valley.—The route has been located and the right of way obtained for an extension from Jacksonport, Ark., to Batesville, a distance of 23 miles northwest up the White River. This road extends from Brinkley, Ark., north, 58 miles to Jacksonport, with a branch of six miles from Coats to Gregory. W. J. Thompson, of Little Rock, Ark., is President and General Manager.

Electric Railroad Construction.

Allegheny, Pa.—On July 15 the following companies were granted a charter to operate short connecting lines: The Ross Electric Railway Co., over the Pennsylvania plank road, a distance of three-fourths of a mile; capital stock, \$4,500. The Northern Electric Railway Co., to run from a connection with the former road to Pennsylvania, a distance of 4 miles; capital stock, \$24,000. The Greentree Electric Railway Co., to run over the same plank road for a distance of one-third of a mile; capital stock, \$2,000. The directors of the above roads are: M. K. McMullen, Allegheny, President; George B. Hill, Charles K. Hill, J. G. Nicholson and Arthur Davis.

Amherst, Mass.—The Amherst & Sunderland Street Railway Co. was given a hearing by the Railroad Commissioners on Tuesday on a petition for the right to issue \$22,000 bonds, an equal issue of stock having already been authorized.

Braintree, Mass.—The Railroad Commissioners have issued an order to permit the Braintree Electric Railway Co. to purchase the Randolph road. An increase of \$35,000 capital to pay for the road purchased is authorized.

Bridgewater, Mass.—Work has been begun on the Bridgewater, Whitman & Rockland road, referred to among our notes of March 26 last.

Chicago.—The Chicago Electric Traction Co. has been incorporated, with a capital stock of \$30,000, by Z. Foster, E. Foster, S. Foster and W. G. Foster.

Englewood, N. J.—The ordinance granting the Englewood Electric Street Railroad Co. the right of way on Palisade avenue from Dean to Van Brunt street has been signed by the Mayor.

Fayette City, Pa.—Mr. H. H. Penny & Co., Charleroi, has been awarded the contract for building the Charleroi, Bellevernon & Fayette City Street Railway. It is stated that work will be begun at once.

Greensburg, Pa.—Press reports state that Benjamin F. Myers, of Harrisburg, and Ex-Judge Sadler, of Carlisle, are among those interested in the proposed electric road to be built from Greensburg, with branch lines extending from the city to a number of points.

Long Branch, N. J.—The Supreme Court Justice has removed the writ restraining the Atlantic Highlands, Red Bank & Long Branch Electric Railway Co. from building its road, as mentioned in our items of May 14 last.

Madison, Wis.—The White Fish Bay Railway Co. has filed articles of incorporation, with a capital of \$1,000, to build an electric road at White Fish Bay.

Meadville, Pa.—Messrs. Smethurst & Allen, Philadelphia, have been awarded the contract for all the overhead work on the interurban electric line of the Meadville Traction Co.

Medway, Mass.—Grading on the Medway Line is now being rapidly pushed and it is expected that it will be completed this week.

Milford, Mass.—The acceptance of the Milford and Upton franchises by the Milford & Upton Street Railway Co. has been filed.

Milwaukee, Wis.—The Milwaukee & Wauwatosa Street Railway Co. is making final arrangements for building its line along certain streets, as previously referred to among our notes.

New York.—The State Board of Railroad Commissioners will give a hearing on Aug. 4 on the application of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad Co. for the approval of change of motive power from horse to electricity. The Board will also give a hearing on the same day on the application of the Second Avenue Railroad Co. for a change of motive power. The electric conduit construction is proposed in both cases.

Oswego, N. Y.—A proposal has been made to organize the Oswego Street Railway Co. to operate the lines now controlled by the Lake Ontario & Riverside Railway Co. It is proposed to place the capital stock of the new company at \$300,000, \$100,000 of which will be preferred stock and the remainder common stock. Mr. F. H. Tidman is Receiver of the latter company.

Palmer, Mass.—The projectors of the proposed electric street railroad from Palmer southward four miles to Monson are renewing their efforts to begin building the road, and it is said that a committee has already secured subscriptions sufficient to warrant the commencement of work soon.

Philadelphia.—By a decision rendered last week the Philadelphia & Bristol Passenger Railway Co. will be permitted to build its line from Bristol to a point where the construction was interrupted, providing no present grades are altered.

Pottsville, Pa.—The Council is considering the ordinance granting an extension of time for the construction of the Schuylkill Haven Branch of the Schuylkill Electric Railway Co. on South Center street.

Quebec, Que.—The electric road running along the streets on the lower levels of the city is now completed, and the power-house will be ready in a week or two and the road will be in operation shortly after.

Sherbrooke, Que.—Macartney, McElroy & Co., New York, have been awarded the contract to supply all material required to build the eight miles of road for the Sherbrooke Street Railway Co.

Titusville, Pa.—Work has been begun on the Titusville Electric Railroad and it is expected that the line will be completed before fall.

Uniontown, Pa.—The Uniontown Electric Street Railway will be extended south to Brownfield, about five miles. The contract has been awarded and the road will be finished next winter.

Waterville, Me.—The Waterville, Fairfield Electric Railway & Light Co. has been organized, the movement having been headed by I. C. Libby, of Waterville, and W. C. Spalding, of Boston, for the bondholders.

Wilmington, Ill.—Articles of incorporation have been filed with the Secretary of State of the Kan-kakee, Wilmington & Morris Electric Street Railway Co., which proposes to build a road from Kan-kakee to Morris through Wilmington. Capital stock, \$50,000. The incorporators and the first board of directors are: Frank B. Handwerk, Morris; T. J. Divan, Chicago; A. D. Ehrlich, Kan-kakee; C. L. Bennett, P. I. Cromwell and J. L. Lius, Wilmington; J. A. Henry, Joliet.

GENERAL RAILROAD NEWS.

Atlantic & Pacific.—Holders of certificates of four per cent. gold trust bonds of this road met in New York July 19 and authorized the Reorganization Committee to execute an agreement for the sale to the St. Louis & San Francisco of the \$2,794,000 Central Division first mortgage six per cent. bonds retained by the committee for the bondholders when the Western Division of this road went into the hands of the Atchison, Topeka & Santa Fe. The terms of the bond sale are \$300,000 cash and \$1,500,000 of St. Louis & San Francisco five per cent. bonds, secured by a mortgage on the Central Division.

Baltimore & Ohio.—The Mercantile Trust Co., of Baltimore, as trustee under the mortgage of 1887 on the main line, filed objections July 19 to the issue of \$2,345,550 in receivers' certificates which was petitioned for by the Receivers for the purpose of purchasing cars and engines. The objections raised are that the Receivers have no right to improve the road, but simply to maintain it as received by them, that the new equipment is not needed on the main line and that its purchase will endanger the payment of interest on the mortgage which they hold as trustee.

Cape Fear & Yadkin Valley.—The United States Court has decided that the Baltimore Reorganization Committee must deliver to C. Adolph Towe, George F. Baker and William E. Strong, composing the New York committee, \$52,000 Series A bonds of the road. These bonds are part of \$520,000 purchased by the New York committee. They were withheld upon the claim that the purchasers were bound by the Baltimore plan of reorganization signed by the original holders. But the Court decides that the bonds were purchased without notice of the signing of the agreement, which is, therefore, not binding upon the present holders. The Baltimore Reorganization Committee will appeal from the order to deliver the bonds. A sale of the road has been ordered by Judge Simonton in the United States Circuit Court at Raleigh, N. C., to take place at Fayetteville, N. C., in August, the upset price being \$2,000,000, with a \$30,000 deposit from each bidder. Some of the New York stockholders have attempted to have the road sold, not as a whole, but in sections corresponding to the A, B and C section bonds. It extends from Wilmington to Mt. Airy, N. C., 248 miles, and has been in the hands of a Receiver for three years.

Cincinnati, Hamilton & Dayton.—The litigation in regard to the purchase of the Indiana, Decatur & Western by this company, in December, 1895, has come to end, it having been decided by the Illinois court that the title of this company is a clear one. It is expected that at the time of the annual meeting of this company, next fall, the Indiana, Decatur & Western will be absorbed. The road extends from Indianapolis, Ind., to Decatur, Ill., 152 miles, and it is said that this company hopes to extend it westward probably to the Mississippi. The Bondholders' Committee of the Indianapolis, Decatur & Springfield, which was the name of the Indiana, Decatur & Western before its reorganization, has announced that a final distribution of the certificates will now be made to the bondholders. The amount distributed will be 39 per cent. or \$390 on each certificate, which, with the previous distribution of bonds, is equal to par and 5 per cent. interest compounded every six months since the first default occurred, which was in April, 1889.

Emmitsburg.—This road has been advertised at public sale, to take place at Frederick, Md., Sept. 11, by John C. Motter, Vincent Lebold, J. Roger McSherry and Isaac S. Annan, trustees. There is seven years' arrears of interest on the bonded debt of the company, amounting to \$121,850, which the Judge of the Circuit Court at Frederick orders shall be met by the sale of the road. This line lies wholly in Frederick County, Md., extending 7.6 miles from Rocky Ridge, on the Western Maryland, north to Emmitsburg. It was opened in 1877 and has been operated by the Western Maryland.

Fonda, Johnstown & Gloversville.—Of the \$700,000 of 4½ per cent. bonds recently authorized, which will run for 50 years from July 1, 1897, \$600,000 will be issued to retire the present 6 and 7 per cent. outstanding bonds, and \$100,000 have been sold to pay for new equipment and for betterments. The latter bonds have been bought by the Edward C. Jones Co., New York, which controls the entire refunding arrangement.

Galveston & Western.—This company has applied to the Texas Railroad Commission to obtain permission to issue \$2,000,000 of bonds. It is proposed to use \$500,000 for the improvement of the road and \$1,500,000 for the erection of wharves and elevators at Galveston, Tex.

Harriman & Northeastern.—George L. Burke, of Kingston, Tenn., was appointed permanent Receiver of this road by Chancellor Lindsay at Kingston, July 15, to succeed George W. Chandler, temporary Receiver. The road was sold under foreclosure July 22, 1895. It extends 22 miles from Harriman Junction north to Petros, Tenn., with a branch from James Ferry to Iron Mines, Tenn., seven miles.

Louisville & Nashville.—The preliminary report of the company for the year ended June 30 shows the earnings to have been as follows (estimated for 1897):

	1897.	1896.	Inc. or Dec.
Gross earn.....	\$20,361,656	\$20,397,711	D. \$36,055
Oper. expen.....	13,835,434	13,505,206	I. 330,228
Net earn.....	\$6,526,222	\$6,892,505	D. \$366,283
Other income.....	422,173	431,371	D. 9,198
Total.....	\$6,948,395	\$7,323,876	D. \$375,481
Int., tax and rent ..	5,570,012	5,563,056	I. 6,956
Balance.....	\$1,378,383	\$1,760,820	D. \$382,437
Other charges.....	416,224	379,317	I. 36,907
Surplus.....	\$962,159	\$1,377,503	D. \$415,344

Charges other than interest, rentals and taxes were in 1897: Loss Georgia R. R., \$31,680; loss other roads, \$50,258; net sinking fund, \$194,266; unfunded discount, \$20,947; North & South Alabama, \$118,677. The percentage of operating expenses to earnings was 67.95 in 1897, against 66.23 in 1896.

Milwaukee, Benton Harbor & Columbus.—A controlling interest has been acquired by this road in the South Haven & Eastern, a narrow-gauge road running from South Haven, Mich., southeast via Hartford, 37 miles, to Lawton. The Milwaukee, Benton Harbor & Columbus is now being constructed from Benton Harbor, Mich., southeast to Buchanan, and the intention is to extend it to Nappanee, Ind. The two roads are expected to be ultimately under one management.

Nashville, Chattanooga & St. Louis.—The earnings for the year ended June 30 were as follows:

	1897.	1896.	Inc. or Dec.
Gross earn.....	\$5,116,118	\$5,071,625	I. \$44,493
Oper. expen.....	3,204,671	3,164,350	I. 40,321
Net earn.....	\$1,911,447	\$1,907,275	I. \$4,172
Int., tax. and rent.....	1,508,432	1,498,482	I. 9,950
Surplus.....	\$403,015	\$411,793	D. \$8,778

New York Central & Hudson River.—The \$100,000,000 mortgage to the Central Trust Company of New York is being filed in every county of New York, New Jersey and Pennsylvania in which the road has property or leases. The bonds represented by this mortgage are due July 1, 1897, and bear 3½ per cent. interest per annum, payable semi-annually, both principal and interest to be paid in gold. Of these bonds \$85,000,000 are set aside to refund the outstanding bonds, which aggregate \$82,677,333. The remaining \$15,000,000 is to be used in acquiring other roads and in new construction.

Northern New Jersey.—A controlling interest in this road has been bought by the United States Mortgage & Trust Co., of New York, for the Erie Railroad, to which it has already been transferred. The terms of the sale have not been made public. The capital stock of the company is \$1,000,000 and the funded debt \$654,000. The road extends from Bergen Junction, N. J., to Sparkill, N. Y., 21.3 miles, and the company leases the Nyack & Northern, a line 4.4 miles long between Sparkill and Nyack, N. Y. The road has been operated under contract since 1869 by the Erie. President E. B. Thomas, of the Erie Railroad, states that the train service of the recently acquired property will be improved, and that the running time of several trains will be shortened.

Peoria, Decatur & Evansville.—In the interest of the first mortgage bondholders, the Central Trust Company of New York has filed a bill in the United States District Court at Springfield, Ill., to recover interest due July 1, 1897, on \$1,287,000 of first mortgage bonds, which cover the Peoria Division, extending from Pekin to Decatur, Ill. On the remainder of the first mortgage bonds, amounting to \$1,470,000, and covering the Evansville Division, extending from Harvey City, Ill., to Evansville, the interest has been paid. The first mortgage bondholders have also petitioned for a Receiver to represent their interests. The road is now in the hands of E. O. Hopkins, the Receiver appointed on the application of the second mortgage bondholders.

Peterborough & Hillsboro.—The New Hampshire Railroad Commissioners have received a petition from this road asking permission to issue \$100,000 in bonds to replace a like amount of 20-year bonds now due. A hearing has been ordered in Concord, N. H., Aug. 8. This road is operated under lease by the Boston & Maine, which guaranteed the payment of interest on the first mortgage bonds to the Northern Railroad Co., owners of the bonds.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The earnings for June and for the six months ended June 30 have been reported as follows:

June.	1897.	1896.	Inc. or Dec.
Gross earn.....	\$1,188,613	\$1,198,235	D. \$9,622
Oper. expen.....	749,813	859,382	D. 109,569
Net earn.....	\$438,800	\$338,853	I. \$99,947
Fixed charges.....	229,906	253,161	D. 23,255
Surplus.....	\$208,894	\$85,692	I. \$123,202
Six months:			
Gross earn.....	\$6,789,666	\$7,250,396	D. \$460,730
Oper. expen.....	5,029,053	5,616,520	D. \$587,467
Net earn.....	\$1,760,613	\$1,633,876	I. \$126,737
Fixed charges.....	1,016,181	1,660,109	D. 643,928
Surplus.....	\$144,432 (def.)	\$26,233	I. \$170,665

South Jersey.—Operation of the branch which was recently built from Petersburg, N. J., on the main line, nine miles east into Ocean City, has been discontinued, and it is stated that the company will take no more business over this line until its affairs have been overhauled. The roadbed is imperfectly surfaced and trains cannot run at fair speed. It is expected that repairs

will be made and the line again put in operation within a short time.

Tennessee Central.—Alexander Tuburan and Thomas McFarland, Contractors, have filed a bill with Clerk and Master Duncan, of Cumberland County, Tenn., against the purchasers of this road alleging an unpaid claim of \$100,000 for work and asking for a receiver. This road was bought for \$125,000 under foreclosure at Crossville, Tenn., June 24, by Col. Jere Baxter, representing a St. Louis syndicate. The road is projected to run from the terminus of the Nashville & Knoxville, near Monterey, Tenn., east to Knoxville, about 92 miles. Grading has been completed from Monterey, in Putnam County, to Harriman, about 60 miles.

Wilmington, Newbern & Norfolk.—This road was sold at public auction at Wilmington, N. C., July 15, for \$400,000, which was \$150,000 above the upset price. The purchaser was Warren C. Elliott, President of the Wilmington, Columbia & Augusta, a part of the Atlantic Coast Line, and representing a syndicate which proposes to form a company to be known as the Wilmington & Newbern Railroad Co. The road will probably be operated as a part of the Atlantic Coast Line. It extends from Wilmington northeast through Jacksonville to Newbern, 88 miles.

Wabash.—The U. S. Circuit Court of Appeals has issued a mandate to the Circuit Court to enter a decree requiring this company to pay James Crompton \$339,920.40 with interest at 6 per cent from May 1, 1888, and directing the sale of that portion of the road from Toledo, O., to the western boundary of Ohio, if the judgment is not paid. The case was begun in the State Court about 15 years ago, by J. R. Jessup and others to recover \$150,000 of equipment bonds owned by Mr. Crompton in the old Toledo & Wabash before it became absorbed in the Wabash.

Electric Railroad News.

Colorado Springs.—The necessary bonds for the construction of the Canon City & Cripple Creek Railroad have been placed, and the electric road will probably be built this summer.

Saginaw, Mich.—The City Council has declared the franchise of the Union Street Railway Co. forfeited, and measures have been taken to compel the company to pay certain special improvement taxes. This action was taken on the strength of the recent decision by the Supreme Court, sustaining the right of the city to take any measures to compel the company to settle the outstanding debts with the city.

St. Louis.—The sale of the Fourth Street & Arsenal Railway Co. to Albert Arnstein for \$70,050, as reported in our news notes of July 9 has been set aside by Judge Flitcraft, and the property will be turned over to the original company as soon as the formal decree can be drawn.

TRAFFIC.

Traffic Notes.

On Monday, July 19th, 28 carloads of California fruit were sold in New York City.

The Managers of the Joint Traffic Association have recommended the postponement of the proposed advance in west-bound immigrant passenger rates.

The Interstate Commerce Commission has authorized the suspension of the long and short haul law until Dec. 31, for the purpose of making passenger rates from the Eastern states to the Kootenai Mining District, British Columbia, the roads carrying passengers through United States territory having complained that the Canadian Pacific makes rates from New England points unreasonable low.

The freight war between New York and Galveston continues, and successive reductions have been made, bringing the freight rates down to 10 cents per 100 lbs. first-class, 7 cents for wool, and other rates in proportion. On July 17 the new steamship line, the Lone Star, announced in Galveston that cotton would be taken to New York free. The steamship lines have made low rates from New York by way of Galveston to Denver, and the direct railroad lines between New York and Denver expect to have to make reductions in order to retain their traffic.

Galveston Exports.

Statistics of shipping from the port of Galveston for the current season show an increase of 55 per cent. more steamers and an increase in register tonnage of 68½ per cent. dispatched, as compared with the season of 1895-6. A comparison of exports in detail, shows:

	1896-7.	1895-6.
Cotton (bales).....	1,268,272	725,007
Grain (bu.).....	9,213,990	4,486,386
Oil cake and meal (tons).....	133,953	87,270

During the present season 268 steamers have cleared, against 173 in 1895-6. Between 25 and 26 feet of water is now reported on the bar and it is expected to have 27 feet before the end of the year.

Decision on Variable Car-Load Rates.

The Interstate Commerce Commission in an opinion by Commissioner Clements has announced its decision in the case of Sufferin, Hunt & Co. against the Indiana, Decatur & Western. Circulars issued by the railroad company prescribed maximum and minimum carload weights for grain, depending upon the capacity of the car: the rules so prescribed were not shown on the posted tariffs, and application of the rules to three carload shipments of corn carried for complainant resulted in materially increasing the charges above those in force under the published schedules. It was held that the complainant only had to consult the schedule, and that he is entitled to recover charges collected in excess of those set forth in such schedule. Rules affecting rates if issued independently are not lawfully in force. A maximum carload rate, if properly established by the carrier, is held not unlawful, provided the margin between the carrier's maximum and minimum weights is made so wide that shippers may readily comply with both rules.

Rates on Grain Stopped off at Kansas City.

The Interstate Commerce Commission in an opinion by Commissioner Prouty has announced its decision in the matter of alleged unlawful rates and practices in the transportation of grain and grain products by the Atchison, Topeka & Santa Fe and other roads. Shipments of grain were carried to Kansas City, from points west thereof at local rates and quantities of grain were afterward reshipped and rebilled from Kansas City to Chicago at the balance of the established through rate from the original point of shipment to Chicago instead of the

higher rate in force from Kansas City to such destination. It was held that such shipment and reshipment did not constitute a through shipment and that grain so shipped and reshipped was not entitled to the benefit of the through rate. There was no agreement for through carriage between shipper and carrier at the original point of shipment; no other destination than Kansas City was named, and upon carriage of the grain to that point and delivery to consignee, the transportation was completed and the local rate in effect to Kansas City was paid; but the practice was to allow the consignee or other owner of grain at Kansas City to ship from Kansas City to Chicago and other points at the "balance of the through rate," upon presentation of the paid expense bill to Kansas City and certification by a joint agent at Kansas City. Under this "expense bill" practice it was practicable, through transfer of expense bills, to secure a lower "balance of through rate" than would result from deducting the local rate between the actual point of origin and Kansas City from the through rate between said point of origin and the final destination, and other rate manipulations were possible.

New York Central Family Tickets.

As is well known, the 50-trip family tickets sold by the New York Central, at stations within 75 miles of New York City, for travel to and from that city, are good not only for members of the purchaser's family and his servants, but also for visitors to the family. The term "visitor" has, we believe, been quite liberally interpreted, as indeed it must be if conductors are to get through their trains, and tickets have been used practically without regard to the names written upon them. (Indeed the road has, we believe, taken legal measures against speculators at country stations who unduly stretched even this very elastic rule.) But when it comes to paying damages for personal injuries the question as to what constitutes a visitor is not allowed to pass quite so easily, and a case has just been reported, in the Appellate Division of the New York Supreme Court, where a woman who was injured while getting off a train had her suit thrown out of court on the ground that she was not properly a passenger; she was riding on a ticket belonging to A. R. Heath, but it appears that to call her a visitor in the Heath family required a greater stretch of language than the court would approve. The plaintiff was not a member of the family of Heath, nor employed as a servant therein, but was a neighbor, having social intercourse with that family and in the habit of visiting it. The Court holds, in an opinion by Justice Cullen, that the plaintiff was not a "visitor" to the Heath family within the meaning of that term as used in the ticket; that the term was not used in the ticket in its broad, though accurate, meaning, of one who goes to see another from time to time in the relation of social intercourse, but was to be confined to persons visiting the family at the time, and becoming temporary members of the family as "guests." It is held, however, that if the plaintiff in the use of the ticket acted in good faith and in the honest belief that she was entitled to ride upon it, the company issuing it would be liable for an injury occasioned to her by its negligence; and that the question of good faith should be decided by the jury.

Chicago Traffic Matters.

CHICAGO, July 21, 1897. The situation as regards the eastbound Christian Endeavor tickets is no longer alarming. Chairman Caldwell held a conference with the San Francisco local representatives, and succeeded in gaining their cooperation in stiffening matters up. The initial lines have withdrawn their request for continuance of sale to include the 24th. Should there be the congestion anticipated the initial lines will forward out of Frisco and Los Angeles on Tuesday and Wednesday the business they are unable to provide for on Monday and Thursday; all such tickets to bear regular selling date on Monday. Mr. Caldwell has approved this arrangement upon the unanimous recommendation of the local representatives. Mr. Caldwell has also succeeded, it is believed, in stopping payments of commissions. This trouble was limited to two or three of the weaker lines, and has not cut any serious figure in the routing of the business.

The antics of the Soo line continue to be a disturbing element. It has made a rate to the Feast of St. Anne, at St. Anne, Que., of \$30 round trip, good going July 21, with return limit Aug. 31, and this has been met by the Chicago Great Western via Chicago in connection with the Wabash and the Grand Trunk. The Great Western has also given notice that it will meet Soo line competition in the sale of tickets from St. Paul and Minneapolis to Chicago on July 21. The Soo announced a rate of \$14 to Chicago and return via Mackinaw and the steamer Manitowish, good returning until Aug. 3. As a result of this cut in the Chicago-St. Paul rates all the strong lines are involved in another tangle.

The freight rate situation west of the Mississippi River is far from satisfactory and there is much apprehension of a general demoralization. Grain rates are generally unsettled; no agreement has been reached in regard to lumber rates, and the steamship war via Galveston threatens to demoralize all Missouri River and Gulf rates. The managers expect to hold another meeting this week at which a determined effort will, it is said, be made to arrive at a basis on which rates may be maintained. The obstacle is that the emasculated agreements practically allow each member to make any rate upon notifying the Chairman of its intention so to do.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western termini of the trunk lines for the week ending July 15 amounted to 56,730 tons, as compared with 57,760 tons the preceding week. This statement includes 17,103 tons of grain, 3,439 tons of flour and 13,190 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING JULY 15.		WEEK ENDING JULY 8.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.....	3,663	6.5	3,043	5.3
C. & C. & St. Louis.....	2,722	4.8	3,047	5.3
Erie.....	8,424	14.8	11,043	19.1
Grand Trunk.....	6,765	11.9	6,462	11.2
L. S. & M. S.....	4,184	7.4	3,117	5.4
Michigan Central.....	2,803	4.9	3,163	5.5
N. Y., Chi. & St. L.....	12,260	21.6	9,667	16.7
Pitts., Cin. & St. Louis.....	4,746	8.4	5,411	9.4
Pitts., Ft. Wayne & Chicago.....	7,786	13.7	9,322	16.1
Wabash.....	3,377	6.0	3,485	6.0
Totals.....	56,730	100.0	57,760	100.0

Lake shipments last week were 96,670 tons.